REPORT

OF THE

ADJUTANT-GENERAL

STATE OF CONNECTICUT,

TO THE

COMMANDER-IN-CHIEF.

FOR THE YEAR 1880.

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REPORT.

General Headquarters State of Connecticut,
Adjutant-General's Office,
Hartford, December 1, 1880.

His Excellency Charles B. Andrews,
Governor and Commander-in-Chief:

Sir: In compliance with the law, I have the honor to report herewith the condition of the National Guard, also forward a roster of its Commissioned Officers and reports of various officers and commissions.

There has been but little change in the National Guard the past year, one company, F, 4th Regiment, located at Greenwich, having been disbanded and a new company formed to take its place at Norwalk.

MUSTER AND INSPECTION.

By General Orders, No. 10, a muster and inspection of the National Guard was ordered in November by the following Officers: First and Second Regiments by Lieut. Colonel Lewis L. Morgan, Brigade-Adjutant, Third and Fourth Regiments by Major John B. Clapp, Brigade Inspector, and Fifth Battalion and Artillery by Lieut.-Colonel Simeon J. Fox, Assistant Adjutant-General. The returns of this muster show that the National Guard is composed of 183 Commissioned Officers and 2731 enlisted men, giving a total of 2914 as the active military force of the State. This shows a decrease during the year of 163. The number present at muster was 2088, and 826 were reported absent. The percentage present of each Regiment being as follows: First Regiment, .83; Second Regiment, .80; Third Regiment, .59; Fourth Regiment, .66; Fifth Battalion, .68; Artillery, .68. The per cent. present of entire force was .72 against a percentage of .77 in 1879.

The number present in all but the First and Second Regiments is lower than it should be, and I recommend that a law be enacted fixing the same fine for absence from muster as for absence from parades and encampments, and that companies mustering less than 60 per cent. or receiving less than 75 per cent. of credits be disbanded.

From the reports of the Mustering Officers, I think that the muster and inspection was not as favorable as that of one year ago, partly accounted for by a demoralization in a few of the commands from local causes, which my successor can easily remedy, but more largely by the time at which I was obliged to order the muster, it coming immediately after the recent exciting political campaign, in which nearly all the members of the Guard were more or less engaged. This affected more particularly the First and Fourth Regiments, who were mustered between the 10th and 20th of November, some of the commanding officers not receiving notice of date fixed for muster in time to issue warnings to all their members. The reports of the Mustering Officers contain valuable information regarding the condition of the companies and will be referred to my successor for action.

There have been 30 officers who have resigned and been discharged during the year, 1 has died in service, 2 have been dismissed, and the conditional appointments of 7 have been revoked.

Of the enlisted men 678 have been discharged, 17 have died in service, and 27 have been promoted to be commissioned officers. The enlistments number 558 and 14 commissioned officers have been appointed from civil life.

I have also to report the death of Capt. D. A. O'Neil, Co. K, 3d Regiment, who died just one week after the close of the encampment; but his fatal disease, as I am informed by his physician, was not contracted at camp. Capt. O'Neil had been but one year in service, he having organized Co. K, 3d Regiment, at Willimantic in August, 1879. His term of service was short, but he had fully shown that he was a prompt, faithful and efficient officer.

ENCAMPMENT AND PARADES.

The annual encampment was participated in by the First Regiment, Colonel Barbour, the Third Regiment, Colonel Tubbs, and the two Platoons of Artillery under the command of Lieutenant Lee, all being encamped at Niantic, for six days, August 23rd to 28th, under command of Brig.-General Stephen R. Smith.

One or two days of the tour of duty were extremely warm and some sickness was caused, but nothing that resulted fatally. The review of the command by your Excellency on Friday, showed that it was in good condition as to drill and discipline. The total number present at camp was 1250, and 158 were absent. The percentage present was 83. In the appendix will be found the report of Major Clapp, Brigade-Inspector, and the consolidated morning reports of the commands in camp. Believing that the presence and inspection by an Officer of the Regular Army would be beneficial to the command, the Adjutant-General of the Army was requested to detail an Officer to attend the encampment. The correspondence in regard to the matter is given herewith:

GENERAL HEADQUARTERS STATE OF CONNECTICUT.
ADJUTANT-GENERAL'S OFFICE,
HARTFORD, JULY 1, 1880.

GENERAL: The First and Third Regiments and the Artillery, Connecticut National Guard, will encamp at Niantic, Conn., near New London, under command of Brig.-General S. R. Smith. for six days commencing Aug. 23d, 1880.

The Commander-in-Chief would be pleased to have any Officer or Officers of the U. S. Army detailed to inspect the command during the week of encampment. Quarters will be provided.

Very respectfully,

(Signed), EDWARD HARLAND,

Adjutant-General.

BRIG.-GENERAL R. C. DRUM,

Adjutant-General, U. S. A.

Washington, D. C.

War Department,
Adjutant General's Office,
Washington, July 23, 1880.

Sir : I am much gratified by the receipt of yours of the 1st instant, which reached here during my absence at Fort Leavenworth, and have the pleasure to inform you that a suitable Officer of the Army will be present on the occasion to inspect General Smith's command.

I am, Sir,

Very respectfully,

Your obedient servant,

(Signed), R. C. DRUM,

Adjutant-General.

To the Adjutant-General,
State of Connecticut, Hartford.

Lieut.-Colonel Roger Jones, Assistant Inspector-General U. S. A. was detailed for duty as above, and he reported at the encampment on Tuesday morning and remained in camp witnessing the drills, manœuvers, inspections and ceremonies until the morning the encampment was broken.

The report of Colonel Jones, which was made to the Adjutant-General, U. S. Army, a copy of which was furnished your Excellency, was published to the National Guard in General Orders, No. 9, and will be found among the General Orders published with this report.

The presence of Col. Jones in camp was an incentive to officers and men to perfect themselves in drill and to maintain discipline, and now that the War Department is taking renewed interest in the Militia, the attendance of officers from the Regular Army at the annual encampments should be encouraged for our own benefit and that there may be a closer connection between the Regular and Volunteer service.

As of interest in connection with this matter, I publish the letter of the Adjutant-General, U. S. A., transmitting the report.

War Department,
Adjutant-General's Office,
Washington, Sept. 16, 1880.

Sir: I have the honor to transmit herewith a copy of the report made by Colonel Roger Jones, Assistant Inspector General, of his inspection of the Connecticut National Guard encampment at Niantic in July last.

Permit me in doing so, to express my gratification at the high praise which Colonel Jones felt was justly due to the National Guard of Connecticut, and with him, I rejoice at the appreciation so freely and generally expressed by both Officers and men of the interest manifested by the Department in all that concerns the welfare and advancement of the Militia of the States.

I have the honor to be
Very respectfully,
Your obedient servant,
(Signed), R. C. DRUM,
Adjutant-General,

His Excellency, Charles B. Andrews,
Governor of Connecticut,
Hartford, Conn.

The Second Regiment, Colonel Graham, the Fourth Regiment, Colonel Crofut, and the Fifth Battalion, Major Layne, paraded one day by Battalion in May, and one day by Company in September. The May parade of these commands was not of much benefit to them, the excessive heat and the short time the companies were together making it impossible to do much drilling.

I doubt if the one day's drill in May is of any real benefit to the National Guard, and I would recommend that the spring parade be dispensed with, and the Regiments all be encamped yearly for six or eight days. The encampments are certainly of great value to all concerned, and without them a soldier's complete duties cannot be learned.

EXPENSES.

The expenses of the National Guard for the fiscal year have been $88,609.67, and for the Governor's Guards $9,846.08, and $200 for independent companies. In addition to the above expenses of the Governor's Guards,

the last General Assembly authorized other expenditures, to be paid by the Comptroller, amounting to $5,175, making their total expenses $15,021.08, and I find by the Comptroller's Report that this amount has been charged to National Guard expenses.

As these companies were organized for the protection of the Governor and General Assembly, I think their expenses should be charged to the Executive and Legislative account.

The pay rolls of the Governor's Guards are approved by the Adjutant-General, and paid by the Paymaster General, but as this office has no means of verifying the rolls, as is done with the National Guard, I recommend that the rolls be paid by the Comptroller, on approval by the Governor.

MAXIMUM OF COMPANIES.

Owing to the increase by the General Assembly, in number of companies of the National Guard, and the apparent necessity of keeping the expenditures as low as possible, consistent with the welfare of the force, the maximum of the infantry companies, was by General Orders No. 3, dated April 15th, 1880, limited to 66 Officers and men. This will allow a total force of 3134 Officers and men.

This order was issued after mature deliberation, and upon the conviction that the action was necessary alike for the welfare of the National Guard and the interests of the State.

Under the maximum of 82 officers and men to a company, as allowed by law, the total force would consist of 3838 men, and to equip and uniform this entire number would create an expense from which the State would not receive a corresponding benefit. It has been judged, and I think rightly, that a uniformed force of 3000 men was all that the State needed, or would require on any sudden emergency, or could afford to uniform and equip.

The tendency also with the limit at 82 men is to carry

quite a number, who I can only denominate as paper men, good at filling a roll, but not appearing at drills, parades, or musters, and further, experience has shown that in the effort in some companies to carry the maximum number, due care has not always been taken in recruiting, and men have been enlisted, who were not a credit to the organization, and who would not have been taken except to fill up the roll.

I believe also, that the limit of 66, is larger than in any State where the force is uniformed, equipped, and paid as in this State.

I would also call attention to the fact that, under the bill now before Congress to re-organize the Militia, which undoubtedly will soon be enacted, Section 4 reads as follows:

"In time of peace, the number of the State or National Guard of each State, upon which such State shall be entitled to receive aid under this act, shall not exceed seven hundred regularly uniformed commissioned Officers and enlisted men for each congressional representative:" This would allow a total for this State of 2800 men, and our force at this date amounts to 2914. The experience of the past seven months under the maximum as fixed by General Orders No. 3, has fully demonstrated to my mind that the action taken was proper, and has inured to the benefit of the Guard and the State. I do not recommend that the law be changed limiting the maximum to 66 men, as under the present condition the total number of the force could, in an emergency, be increased by 700 men, without any additional Officers or legislation.

MILITARY ENROLLMENT.

The returns of the Military enrollment by the Selectmen, which will be found in the appendix, show that there are 79,209 persons in the State liable to military duty. Of that number 52,282 are liable to pay the Commutation tax, giving $104,564 as the amount of tax collected for

the year. These figures show an increase of 5,318 in the number of inactive militia, 5,199 in the number liable to tax, and $10,398 in the amount of tax.

TARGET PRACTICE.

In the matter of Target Practice, I cannot report that improvement or interest that I hoped and expected to see fully exemplified. The report of Major James E. Stetson, Brigade Inspector of Target Practice, to which I call attention, is very full, and shows what has been accomplished in each Regiment and Company. Its careful perusal by all commanding Officers of the Guard must be attended with pride by those whose commands have made a satisfactory showing, and the reverse by those where but few or no marksman's badges have been won.

The number of marksmen qualifying during the year is 546, divided as follows: First Regiment, 316, Second Regiment, 148, Third Regiment, 12, Fourth Regiment, 65, Fifth Battalion, 1; Brigade Staff, 4.

This record is very creditable to the First Regiment, which shows a number of marksmen exceeding that of the balance of the Brigade. The excellence of the Regiment in this matter is commended, with the hope that its example will be followed by the other Regiments.

Commanding Officers having experienced considerable trouble in the care and return of Marksman's Badges, I have thought it advisable to give the Badges to the members who won them, and thus relieve Officers of all responsibility for them as State property. The order has been but recently issued, but from the expressions of satisfaction with which it is received, I look for increased interest during the year 1881 in the competition for the Badges. Hereafter those marksmen who have once won a badge, will receive the addition of a bar only. It is a serious question whether the percentage in competitions for these Badges should not be increased, and additional safeguards thrown around the competitions, and I desire to call the attention of my successor to this matter, which

should be settled before the spring competitions commence.

Considerable interest appears to be taken in the target competitions that have taken place, the past two years, at Quinnipiac Range, New Haven. An annual State competition would appear to be necessary for the purpose of keeping alive the spirit of rivalry, without which the military does not prosper, and I would therefore suggest that it might be well for the State authorities to encourage these competitions by a system of prizes.

The report of Major Stetson will also be found interesting, in its report of the Target Practice of the Artillery, and while the practice referred to is not the first in the State, it is I think the first in which full statistics have been taken and presented. It is evident from the facts presented, that the guns issued to our Artillery should be inspected and if found defective or obsolete the necessary change should be made. The Quartermaster General has always found it difficult to procure ammunition of proper calibre for the guns.

PAYMENTS.

I would recommend that some change be made in the manner of paying the National Guard for services performed under the law, for parades and encampments. At present, payment is made to the Captains by the Paymaster General, for the entire amount of the pay rolls, and he pays the members of his command.

As each Regiment has a Paymaster I think he should be placed under proper bonds and payments made through him to the members. This would save any opportunity for irregularities and would result in placing the men's pay where it properly belongs.

CAMP GROUND.

A commission was authorized by the last General Assembly to examine and report in regard to a permanent camp ground for the National Guard. I am not aware

what the report or recommendations of the Commission will be, but the matter is one that is important and is becoming more imperative each year.

CATALOGUE OF VOLUNTEERS.

In 1869 a Catalogue of Connecticut Volunteers was published, of which the State took 1000 copies, all of which have been distributed; but very few of the copies have reached Officers who were connected with the service, and there are numbers who on account of the large calls for evidence regarding pensions, that require the books to guide their memories regarding the service of the soldiers of their commands. I have learned, in making enquiries for these books, that there are about 800 copies, unbound, which can be procured at a low figure. I hope therefore that the General Assembly will authorize the Adjutant-General to buy the Catalogues and bind up a part for distribution to Commanding Officers of the Volunteers in the late war.

REVOLUTIONARY RECORDS.

The Revolutionary Records referred to in my last report still remain in the Pension Office, there being no way of getting them copied by that Department as long as the pension business continues as for the past year. I trust that the records can at some time in the near future be secured for the State.

PENSIONS.

The record of the Pension and Bounty business prosecuted through the Office will be found in the appendix. The business has been very large for the year, especially in the filing of new claims covering arrears of pension, June 30th, 1880, being the limit of time for filing such claims.

From the indications of the present year, it will probably be ten years or more before the claims filed in June can be reached for settlement, unless a change in manner of settlement of claims is made by Congressional action.

ACCOMPANYING PAPERS.

I respectfully ask your attention to the following tables and papers which comprise an appendix to this report:

1. Roster of the National Guard.
2. Abstract of Muster Rolls of 1880.
3. Table showing enlistments, discharges, etc.
4. Military enrollment.
5. Reports of Brigade Inspector, Brigade Inspector of Target Practice, and Examining Board.
6. Report of Pension and Bounty business.
7. General Orders.

I am, Sir,

Very respectfully,

Your obedient servant,

EDWARD HARLAND,

Adjutant-General.

[1]

ROSTER.

COMMANDER-IN-CHIEF AND STAFF.

Commander-in-Chief,

CHARLES B. ANDREWS, Litchfield.

Adjutant-General—Rank, Brigadier-General.

	Date of Rank.
EDWARD HARLAND, Norwich,	Jan. 10, 1879.

Quartermaster-General—Rank, Brigadier-General.

LEVERETT W. WESSELLS, Litchfield,	Jan. 10, 1879.

Surgeon-General—Rank, Brigadier-General.

HORACE S. FULLER, Hartford,	Jan. 10, 1879.

Commissary-General—Rank, Brigadier-General.

WILLIAM H. BULKELEY, Hartford,	Jan. 10, 1879.

Paymaster-General—Rank, Brigadier-General.

FRANK D. SLOAT, New Haven,	Jan. 10, 1879.

Aids to the Commander-in-Chief—Rank, Colonel.

CHARLES L. DEAN, Ashford,	Jan. 10, 1879.
WILBUR F. COE, Winsted,	Jan. 10, 1879.
CHARLES EVARTS, Salisbury,	Jan. 10, 1879.
CHARLES T. MORSE, New Haven,	Jan. 10, 1879.

Assistant Adjutant-General—Rank, Lieutenant-Colonel.

SIMEON J. FOX, New Haven,	May 10, 1869.

Assistant Quartermaster-General—Rank, Major.

THERON C. SWAN, Hartford,	May 14, 1873.

CONNECTICUT NATIONAL GUARD.

Brigadier-General.

	Date of Rank.
STEPHEN R. SMITH, New Haven,	July 6, 1878.

Brigade Adjutant—Rank, Lieutenant-Colonel.

LEWIS L. MORGAN, New Haven,	July 6, 1878.

Brigade Inspector—Rank, Major.

JOHN B. CLAPP, Hartford,	July 6, 1878.

Brigade Quartermaster—Rank, Major.

THOMAS L. WATSON, Bridgeport,	Jan. 30, 1879.

Brigade Commissary—Rank, Major.

SAMUEL C. WALDRON, Stonington,	July 6, 1878.

Brigade Inspector of Target Practice—Rank, Major.

JAMES E. STETSON, New Haven,	Sept. 13, 1877.

Aides-de-Camp—Rank, Captain.

WILLIAM H. STEVENSON, Bridgeport,	Mar. 29, 1879.
EDWIN McNEILL, Litchfield,	Dec. 21, 1880.

ARTILLERY.

First Platoon.

Rank.	Name.	Residence.	Date of Rank.
1st Lieutenant,	William H. Lee,	Guilford,	Nov. 16, 1874.
2d Lieutenant,	William T. Foote,	Guilford,	May 29, 1875.

Second Platoon.

1st Lieutenant,			
2d Lieutenant,	Holcomb N. Jones,	Clinton,	Feb. 10, 1879.

FIRST REGIMENT.

Colonel.

	Date of Rank.
LUCIUS A. BARBOUR, Hartford,	June 26, 1878.

Lieutenant-Colonel.

WILLIAM E. CONE, Hartford,	June 26, 1878.

Major.

ARTHUR L. GOODRICH, Hartford,	June 26, 1878.

Adjutant—Rank, Captain.

JOHN K. WILLIAMS, Hartford,	Aug. 3, 1878.

Quartermaster—Rank, First Lieutenant.

RICHARD O. CHENEY, South Manchester,	Aug. 3, 1878.

Paymaster—Rank, First Lieutenant.

WILLIAM B. McCRAY, Hartford,	Aug. 23, 1878.

Surgeon—Rank, Major.

GEORGE W. AVERY, Hartford,	Aug. 3, 1878.

Assistant-Surgeon—Rank, First Lieutenant.

HARMON G. HOWE, Hartford,	Aug. 23, 1878.

Inspector of Target Practice—Rank, Captain.

JABEZ L. WOODBRIDGE, North Manchester,	Jan. 19, 1877.

Chaplain.

JAMES W. COOPER, New Britain,	Aug. 30, 1878

Company A.

Rank.	Name.	Residence.	Date of Rank.
Captain,	William Westphal,	Hartford,	Mar. 15, 1877.
1st Lieutenant,	Edward Schulze,	Hartford,	Feb. 17, 1874.
2d Lieutenant,	Henry F. Smith,	Hartford,	Mar. 15, 1877.

Company B.

Captain,	Patrick J. Moran,	Hartford,	Aug. 22, 1879.
1st Lieutenant,	Thomas F. Flanigan,	Hartford,	Aug. 22, 1879.
2d Lieutenant,	Patrick H. Smith,	Hartford,	Aug. 22, 1879.

Company C.

Rank.	Name.	Residence.	Date of Rank.
Captain,	Thomas J. Rigney,	Rockville,	Dec. 12, 1879.
1*st Lieutenant*,	Frank Karber,	Rockville,	Nov. 8, 1880.
2*d Lieutenant*,	John Abbey,	Rockville,	Nov. 8, 1880.

Company D.

Captain,	Augustus N. Bennett,	New Britain,	Nov. 20, 1877.
1*st Lieutenant*,	John C. Bingham,	New Britain,	Jan. 5, 1875.
2*d Lieutenant*,	William H. Parr,	New Britain,	Feb. 20, 1879.

Company E.

Captain,	Charles B. Erichson,	New Britain,	Mar. 25, 1872.
1*st Lieutenant*,	Fred. M. Hemenway,	New Britain,	Aug. 6, 1877.
2*d Lieutenant*,	J. Lester Osgood,	New Britain,	Aug. 6, 1877.

Company F.

Captain,	John L. White,	Hartford,	Oct. 6, 1868.
1*st Lieutenant*,	Levi Hotchkiss,	Hartford,	Sept. 4, 1871.
2*d Lieutenant*,	George E. Lee,	Hartford,	June 24, 1878.

Company G.

Captain,	Arthur B. Keeney,	S. Manchester,	Sept. 1, 1879.
1*st Lieutenant*,	Arthur J. Wetherell,	Manchester,	Sept. 1, 1879.
2*d Lieutenant*,	Thos. H. Montgomery,	Manchester,	Sept. 1, 1879.

Company H.

Captain,	George A. Cornell,	Hartford,	Dec. 3, 1880.
1*st Lieutenant*,	Henry Simon, Jr.,	Hartford,	Dec. 3, 1880.
2*d Lieutenant*,	Everett A. Burnham,	Hartford,	Dec. 3, 1880.

Company I.

Captain,	Joseph Reed,	Windsor Locks,	Oct. 15, 1878.
1*st Lieutenant*,	William Bake,	East Windsor,	Oct. 15, 1878.
2*d Lieutenant*,	Hermon W. Butler,	Windsor Locks,	Oct. 15, 1878.

Company K.

Captain,	Thomas M. Smith,	Hartford,	Feb. 10, 1879.
1*st Lieutenant*,	Charles E. Thompson,	Hartford,	Feb. 10, 1879.
2*d Lieutenant*,	Samuel O. Prentice,	Hartford,	Feb. 10, 1879.

SECOND REGIMENT.

	Date of Rank.
Colonel.	
CHARLES P. GRAHAM, Middletown,	July 15, 1878.
Lieutenant-Colonel.	
JOSIAH N. BACON, New Haven,	Sept. 3, 1875.
Major.	
CARL G. ENGEL, New Haven,	July 15, 1878.
Adjutant—Rank, Captain.	
FREDERICK E. CAMP, Middletown,	April 15, 1880.
Quartermaster—Rank, First Lieutenant.	
CLAYTON H. REDFIELD, New Haven,	Sept. 30, 1878.
Paymaster—Rank, First Lieutenant.	
EDWARD S. HAYDEN, Waterbury,	Sept. 30, 1878.
Surgeon—Rank, Major.	
EVELYN L. BISSELL, New Haven.	Feb. 28, 1876.
Assistant Surgeon—Rank, First Lieutenant.	
GEORGE L. BEARDSLEY, Birmingham,	Feb. 8, 1878.
Inspector of Target Practice—Rank, Captain.	
ANDREW ALLEN, New Haven,	Jan. 5, 1880.
Chaplain.	
SAMUEL D. McCONNELL, Middletown,	Sept. 30, 1878.

Company A.

Rank.	Name.	Residence.	Date of Rank.
Captain,	Frederick A. Spencer,	Waterbury,	Feb. 19, 1877.
1*st Lieutenant,*	Frank R. White,	Waterbury,	May 20, 1880.
2*d Lieutenant,*	John B. Doherty,	Waterbury,	May 20, 1880.

Company B.

Captain,	Frank W. Tiesing,	New Haven,	Aug. 14, 1878.
1*st Lieutenant,*	Henry Phillipe,	New Haven,	April 12, 1876.
2*d Lieutenant,*	William Kaehrle,	New Haven,	Aug. 11, 1880.

Company C.

Rank.	Name.	Residence.	Date of Rank.
Captain,	Maurice F. Brennan,	New Haven,	Dec. 4, 1874.
1*st Lieutenant*,	John Carberry,	New Haven,	Dec. 4, 1874.
2*d Lieutenant*,	Edward Lynn,	New Haven,	Nov. 16, 1875.

Company D.

Captain,	Luzerne I. Thomas,	New Haven,	Jan. 6, 1880.
1*st Lieutenant*,	George Lawrence,	New Haven,	Jan. 6, 1880.
2*d Lieutenant*,	Richard W. Waite,	New Haven,	Jan. 6, 1880.

Company E.

Captain,	Henry R. Loomis,	New Haven,	Nov. 4, 1878.
1*st Lieutenant*,	Samuel A. Downes,	New Haven,	Mar. 1, 1875.
2*d Lieutenant*,	Charles W. Bogue,	New Haven,	Nov. 4, 1878.

Company F.

Captain,	George S. Arnold,	New Haven,	July 28, 1879.
1*st Lieutenant*,	Arthur M. Howarth,	New Haven,	Mar. 24, 1879.
2*d Lieutenant*,	Frank A. Bowman,	New Haven,	Dec. 1, 1879.

Company G.

Captain,	Charles R. Bannon,	Waterbury,	Sept. 25, 1871.
1*st Lieutenant*,			
2*d Lieutenant*,	James Horigan,	Waterbury,	Aug. 11, 1879.

Company H.

Captain,	Henry J. Bacon,	Middletown,	Mar. 23, 1880.
1*st Lieutenant*,	Frank E. Nourse,	Middletown,	Mar. 23, 1880.
2*d Lieutenant*,	Joseph T. Elliott,	Middletown,	Mar. 23, 1880.

Company I.

Captain,	Henry B. Wood,	Meriden,	April 5, 1877.
1*st Lieutenant*,	John N. Lane,	Meriden,	April 5, 1877.
2*d Lieutenant*,	William Collins,	Meriden,	Jan. 22, 1880.

Company K.

Captain,	Walter J. Leavenworth,	Wallingford,	Nov. 11, 1880.
1*st Lieutenant*,	George G. LaBarnes,	Wallingford,	Dec. 26, 1878.
2*d Lieutenant*,	Charles O. Norton,	Wallingford,	May 8, 1879.

THIRD REGIMENT.

Colonel.	Date of Rank.
WILLIAM H. TUBBS, New London,	Mar. 6, 1878.
Lieutenant-Colonel.	
EDWARD P. KING, Putnam,	Mar. 6, 1878.
Major.	
HENRY W. JOHNSON, Putnam,	Mar. 6, 1878.
Adjutant—Rank, Captain.	
GEORGE HAVENS, New London,	Feb. 18, 1879.
Quartermaster—Rank, First Lieutenant.	
GEORGE W. PHILLIPS, Willimantic,	Mar. 30, 1878.
Paymaster—Rank, First Lieutenant.	
JOSEPH W. GILBERT, Norwich,	Feb. 14, 1874.
Surgeon—Rank, Major.	
CHARLES M. CARLETON, Norwich,	Mar. 30, 1878.
Assistant Surgeon—Rank, First Lieutenant.	
WILLIAM B. YOUNG, Norwich,	Oct. 28, 1871.
Inspector of Target Practice—Rank, Captain.	
ALONZO W. SHOLES, New London,	Mar. 30, 1878.
Chaplain.	
EDWARD W. BACON, New London,	Mar. 30, 1878.

COMPANY A.

Rank.	Name.	Residence.	Date of Rank.
Captain,	JOHN H. HOXIE,	Mystic Bridge,	Feb. 11, 1876.
1st Lieutenant,	HENRY J. HILL,	Mystic River,	Oct. 1, 1879.
2d Lieutenant,	WILLIAM C. JONES,	Mystic River,	Oct. 1, 1879.

COMPANY B.

Captain,	MICHAEL TWOMEY,	Pawcatuck,	June 7, 1877.
1st Lieutenant,	JAMES O'SULLIVAN,	Pawcatuck,	Aug. 18, 1879.
2d Lieutenant,	DANIEL KELEHER,	Pawcatuck,	Aug. 18, 1879.

Company C.

Rank.	Name.	Residence.	Date of Rank.
Captain,	James J. McCord,	Norwich,	Feb. 2, 1875.
1*st Lieutenant*,	William F. Bidwell,	Norwich,	May 28, 1878.
2*d Lieutenant*,	Arthur L. Story,	Norwich,	Dec. 22, 1879.

Company D.

Captain,	William H. Bentley,	New London,	May 12, 1873.
1*st Lieutenant*,	Fred'k E. St. Clare,	New London,	Nov. 12, 1877.
2*d Lieutenant*,	William M. Mason,	New London,	July 8, 1878.

Company E.

Captain,	Herbert R. Chappell,	Willimantic,	May 14, 1875.
1*st Lieutenant*,	Frank S. Fowler,	Willimantic,	Aug. 18, 1876.
2*d Lieutenant*,	Alexander L. Fuller,	Willimantic,	Aug. 18, 1876.

Company F.

Captain,			
1*st Lieutenant*,	Danforth Clements,	Putnam,	Feb. 18, 1880.
2*d Lieutenant*,			

Company G.

Captain,	Otis Fisher,	Putnam,	May 15, 1879.
1*st Lieutenant*,	Selwin E. Rowe,	Putnam,	May 15, 1879.
2*d Lieutenant*,	Daniel G. Arnold,	Putnam,	July 29, 1879.

Company H.

Captain,	Seth C. Spaulding,	Danielsonville,	Jan. 17, 1880.
1*st Lieutenant*,			
2*d Lieutenant*,			

Company I.

Captain,	Abner N. Sterry,	New London,	Feb. 18, 1879.
1*st Lieutenant*,	J. Emerson Harris,	New London,	Nov. 19, 1878.
2*d Lieutenant*,	Charles F. Chaney,	New London,	Nov. 9, 1880.

Company K.

Captain	Myron P. Squires,	Willimantic,	Sept. 24, 1880.
1*st Lieutenant*,	William M. Snow,	Willimantic,	July 26, 1880.
2*d Lieutenant*,	Charles W. Harrington,	Willimantic,	July 26, 1880.

FOURTH REGIMENT.

		Date of Rank.
Colonel.		
GEORGE S. CROFUT, Bethel,		Oct. 12, 1878.
Lieutenant-Colonel.		
HENRY SKINNER, Winsted,		Oct. 12, 1878.
Major.		
JAMES C. CROWE, South Norwalk,		Aug. 18, 1880.
Adjutant—Rank, Captain.		
DAVID T. HUBBELL, Bethel,		Aug. 21, 1871.
Quartermaster—Rank, First Lieutenant.		
HENRY N. FANTON, Danbury,		Feb. 15, 1880.
Paymaster—Rank, First Lieutenant.		
GEORGE S. ROWE, Winsted,		Nov. 2, 1878.
Surgeon—Rank, Major.		
GEORGE F. LEWIS, Bridgeport,		July 31, 1876.
Assistant Surgeon—Rank, First Lieutenant.		
WILLIAM C. BURKE, Jr., South Norwalk,		May 28, 1877.
Inspector of Target Practice—Rank, Captain.		
SAMUEL C. KINGMAN, Bridgeport,		July 31, 1876.
Chaplain.		
GEORGE A. PARKINGTON, New Haven,		May 28, 1877.

Company A.

Rank.	Name.	Residence.	Date of Rank.
Captain,	Frederick Cole,	Redding,	Feb. 10, 1879.
1st Lieutenant,	William F. Hoyt,	Bethel,	Feb. 10, 1879.
2d Lieutenant,	George B. Fairchild,	Bethel,	Oct. 23, 1880.

Company B.

Captain,	George W. Cornell,	Bridgeport,	July 13, 1880.
1st Lieutenant,	Francis A. King,	Bridgeport,	July 13, 1880.
2d Lieutenant,	Wilfred T. Van Yorx,	Bridgeport,	July 13, 1880.

Company C.

Rank.	Name.	Residence.	Date of Rank.
Captain,	William W. Studwell,	Stamford,	Feb. 11, 1878.
1*st Lieutenant*,	Elias E. Palmer,	Stamford,	Feb. 11, 1878.
2*d Lieutenant*,	Abraham M. Horton,	Stamford,	Dec. 12, 1878.

Company D.

Captain,	Edward F. Jennings,	So. Norwalk,	Sept. 17, 1880
1*st Lieutenant*,	Alvan A. Hauschildt,	So. Norwalk,	Sept. 17, 1880.
2*d Lieutenant*,	Andrew J. Crossmon,	So. Norwalk,	Sept. 17, 1880.

Company E.

Captain,			
1*st Lieutenant*,	James Sheridan,	Bridgeport,	Feb. 24, 1879.
2*d Lieutenant*,	James Donnelly,	Bridgeport,	Feb. 25, 1876.

Company F.

Captain,	Addison A. Betts,	Norwalk,	May 4, 1880.
1*st Lieutenant*,	Ferdinand B. Smith,	Norwalk,	May 4, 1880.
2*d Lieutenant*,	John E. Evenden,	Norwalk,	Aug. 13, 1880.

Company G.

Captain,	George C. Comes,	Danbury,	Jan. 14, 1878.
1*st Lieutenant*,	George A. Vibbert,	Danbury,	April 8, 1878.
2*d Lieutenant*,	Cornelius Delury,	Danbury,	Jan. 12, 1880.

Company H.

Captain,	Alex'r B. Shumway,	Litchfield,	Nov. 8, 1871.
1*st Lieutenant*,	Samuel Cone,	Litchfield,	Nov. 14, 1879.
2*d Lieutenant*,	Franklin P. Perkins,	Litchfield,	Nov. 14, 1879.

Company I.

Captain,	John H. Slocum,	Winsted,	April 5, 1880.
1*st Lieutenant*,	Edward Finn,	Winsted,	April 5, 1880.
2*d Lieutenant*,	William B. Phillips,	Winsted,	April 5, 1880.

Company K.

Captain,	Henry M. Blakeslee,	Stratford,	Nov. 18, 1878.
1*st Lieutenant*,	Charles Wilcoxson,	Stratford,	Nov. 18, 1878.
2*d Lieutenant*,	James W. Scofield,	Stratford,	Nov. 18, 1878.

FIFTH BATTALION (Colored).

		Date of Rank.
Major.		
WILLIAM H. LAYNE, Jr., New Haven,		Aug. 28, 1879.
Adjutant—Rank, Captain.		
CHARLES S. TATTEN, Norwich,		Dec. 20, 1879.
Quartermaster—Rank, First Lieutenant.		
JOSHUA L. HOWARD, New Haven,		Dec. 20, 1879.
Assistant Surgeon—Rank, First Lieutenant.		
COURTLANDT V. R. CREED, New Haven,		Dec. 20, 1879.

Company A.

Rank.	Name.	Residence.	Date of Rank.
Captain,	James H. Wilkins,	New Haven,	Sept. 15, 1880.
1*st Lieutenant,*	George W. Ladieu,	New Haven,	May 20, 1879.
2*d Lieutenant,*	William R. Keyes,	New Haven,	Dec. 10, 1880.

Company B.

Captain,	Lloyd G. Seymour,	Hartford,	May 21, 1879.
1*st Lieutenant,*	Barney W. Holden.	Hartford,	May 21, 1879.
2*d Lieutenant,*	L. Eugene Seymour,	Hartford,	May 21, 1879.

Company C.

Captain,	Frank M. Welch,	Bridgeport,	May 27, 1879.
1*st Lieutenant,*	Robert Butler,	Bridgeport,	Sept. 25, 1879.
2*d Lieutenant,*	William H. Latimer,	Bridgeport,	Mar. 4, 1880.

Company D.

Captain,	John W. Williams,	Norwich,	Dec. 30, 1879.
1*st Lieutenant,*	Luther Harris,	Norwich,	Dec. 30, 1879.
2*d Lieutenant,*	William J. Hargett,	Norwich,	Oct. 23, 1880.

JUDGE ADVOCATES.

		Date of Rank.
First Regimental District.		
Major THOMAS McMANUS, Hartford,		July 17, 1872.
Second Regimental District.		
Major H. LYNDE HARRISON, New Haven,		June 18, 1872.
Third Regimental District.		
—	—	—
Fourth Regimental District.		
Major SAMUEL FESSENDEN, Stamford,		Aug. 30, 1872.

[2]

ABSTRACT OF MUSTER ROLLS FOR 1880, WITH RATINGS BY MUSTERING OFFICERS.

FIRST REGIMENT INFANTRY.

Note.—The Ratings by Mustering Officers are: 4, excellent; 3, good; 2, fair; 1, poor; 0, bad.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Field, Staff and Band	Hartford	9	23	32	1	2	3	35	29	91	----	----	----	----	----	----	----	----	----
Company A	Hartford	3	50	53	----	13	13	66	61	80	4	4	3	4	4	2	4	25	89
" B	Hartford	3	44	47	----	12	12	59	64	80	4	4	3	4	4	3	4	26	93
" C	Rockville	3	43	46	----	11	11	57	65	80	3	3	3	3	3	3	4	22	79
" D	New Britain	3	58	61	----	8	8	69	64	88	4	4	3	3	4	3	4	25	89
" E	New Britain	3	60	63	----	3	3	66	82	95	4	4	4	4	4	4	4	28	100
" F	Hartford	3	46	49	----	17	17	66	79	74	4	4	3	4	4	3	4	26	93
" G	So. Manchester	3	36	39	----	22	22	61	71	64	4	3	3	2	4	3	4	23	82
" H	Hartford	3	56	59	----	4	4	63	82	94	4	4	3	4	4	2	4	25	89
" I	Windsor Locks	3	32	35	----	21	21	56	55	63	3	3	2	3	4	2	4	21	75
" K	Hartford	3	71	74	----	4	4	78	82	95	4	4	3	4	4	3	4	26	93
Totals,		39	519	558	1	117	118	676	734	83	38	37	30	35	39	28	40	247	88

The Mustering Officer reports that Companies B, F and K would have received full credit, except that they appeared without knapsacks, in compliance with Regimental Order, but which was not in compliance with order from General Headquarters.

Second Regiment Infantry.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Field, Staff and Band	Middletown	9	5	14	1	----	1	15	13	93	----	----	----	----	----	----	----	----	----
Company A	Waterbury	3	55	58	----	5	5	63	60	92	4	4	4	4	4	4	4	28	100
" B	New Haven	3	45	48	----	13	13	61	53	79	4	3	4	4	4	4	4	27	96
" C	New Haven	1	35	36	2	25	27	63	69	57	4	4	4	3	3	4	4	26	93
" D	New Haven	3	40	43	----	13	13	56	58	77	3	4	3	4	3	4	4	25	89
" E	New Haven	2	45	47	1	13	14	61	63	77	2	3	3	1	2	4	4	19	68
" F	New Haven	3	43	46	----	11	11	57	52	81	4	3	4	4	4	4	4	27	96
" G	Waterbury	2	43	45	----	19	19	64	70	71	2	2	1	0	2	3	3	13	46
" H	Middletown	3	46	49	----	11	11	60	73	81	4	4	4	4	4	4	4	28	100
" I	Meriden	3	59	62	----	4	4	66	59	94	4	4	4	4	4	4	4	28	100
" K	Wallingford	2	42	44	5	6	7	51	62	88	4	4	4	4	4	4	4	28	100
Totals		34	458	492	5	120	125	617	632	80	35	35	35	32	34	39	39	249	89

THIRD REGIMENT INFANTRY.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Field, Staff and Band	New London	9	22	31	1	4	5	36	36	86	----	----	----	----	----	----	----	----	----
Company A	Mystic Bridge	3	31	34	----	28	28	62	64	55	3	3	3	4	3	3	4	23	82
" B	Pawcatuck	3	32	35	----	20	20	55	68	64	4	4	4	4	4	4	4	28	100
" C	Norwich	3	31	34	----	25	25	59	57	58	2	2	3	0	2	3	4	16	57
" D	New London	3	34	37	----	21	21	58	52	64	2	2	3	4	3	3	4	21	75
" E	Willimantic	3	37	40	----	28	28	68	76	59	2	2	2	3	2	2	4	17	61
" F	Putnam	1	28	29	----	35	35	64	61	45	2	2	2	4	2	2	4	18	64
" G	Putnam	3	29	32	----	29	29	61	72	52	2	2	2	0	2	2	4	14	50
" H	Danielsonville	1	29	30	----	27	27	57	68	53	1	1	1	2	3	2	4	14	50
" I	New London	3	42	45	---	20	20	65	55	68	3	3	4	4	3	4	4	25	89
" K	Willimantic	3	31	34	----	21	21	55	60	62	2	2	2	2	2	2	4	16	57
Totals		35	346	381	1	258	259	640	669	59	23	23	26	27	26	27	40	192	69

FOURTH REGIMENT INFANTRY.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Field, Staff and Band	Bethel	9	23	32	1	3	4	36	35	89	----	---	------	----	----	----	----	------	------
Company A	Bethel	2	29	31	1	27	28	59	68	53	2	2	2	3	2	2	4	17	61
" B	Bridgeport	3	46	49	----	15	15	64	66	77	3	3	4	4	4	4	4	26	93
" C	Stamford	3	20	23	----	39	39	62	61	37	2	2	3	3	2	2	4	18	64
" D	South Norwalk	3	41	44	----	19	19	63	75	70	3	3	4	4	4	4	4	26	93
" E	Bridgeport	3	42	45	----	21	21	66	76	68	3	3	3	2	3	3	4	21	75
" F	Norwalk	3	35	38	----	11	11	49	55	78	4	3	4	4	4	4	4	27	96
" G	Danbury	3	40	43	----	13	13	56	65	77	3	3	3	3	4	3	4	23	82
" H	Litchfield	3	27	30	----	24	24	54	53	56	2	2	3	2	2	2	3	16	57
" I	Winsted	2	43	45	1	20	21	66	65	68	2	2	2	4	2	2	4	18	64
" K	Stratford	3	42	45	----	21	21	66	65	68	3	3	3	4	3	3	4	23	82
Totals		37	388	425	3	213	216	641	684	66	27	26	31	33	30	29	39	215	77

FIFTH BATTALION INFANTRY.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Field and Staff	New Haven	2	2	4	2	1	3	7	1	57	----	----	----	----	----	----	----	----	----
Company A	New Haven	1	36	37	2	22	24	61	64	61	3	3	3	2	4	3	4	22	79
" B	Hartford	3	52	55	----	14	14	69	78	80	3	3	3	4	4	3	4	24	86
" C	Bridgeport	3	43	46	----	16	16	62	72	74	4	3	3	2	4	4	4	24	86
" D	Norwich	3	30	33	----	26	26	59	58	57	2	2	3	3	4	4	4	22	79
Total		12	163	175	4	79	83	258	273	68	12	11	12	11	16	14	16	92	82

ARTILLERY.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
First Platoon	Guilford	2	26	28	----	11	11	39	42	72	3	2	2	4	4	4	4	23	82
Second Platoon	Clinton	2	20	22	----	13	13	35	35	63	2	3	3	4	4	2	4	22	79
Total		4	46	50	----	24	24	74	77	68	5	5	5	8	8	6	8	45	80

RECAPITULATION.

ORGANIZATION.	LOCALITY.	PRESENT.			ABSENT.			AGGREGATE.		Per cent. present, 1880.	RATINGS BY MUSTERING OFFICER.								Per cent. of possible credits.
		Officers.	Men.	Total.	Officers.	Men.	Total.	Muster, 1880.	Muster, 1879.		Discipline.	Instruction.	Military Appearance.	Records.	Arms.	Equipments.	Uniforms.	Total Credits.	
Brig.-General and Staff	New Haven	7	----	7	1	----	1	8	8	87	----	----	----	----	----	----	----	----	----
1st Regiment	1st Cong. Dist.	39	519	558	1	117	118	676	734	83	38	37	30	35	39	28	40	247	88
2d Regiment	2d Cong. Dist.	34	458	492	5	120	125	617	632	80	35	35	35	32	34	39	39	249	89
3d Regiment	3d Cong. Dist.	35	346	381	1	258	259	640	669	59	23	23	26	27	26	27	40	192	69
4th Regiment	4th Cong. Dist.	37	388	425	3	213	216	641	684	66	27	26	31	33	30	29	39	215	77
5th Battalion	At Large	12	163	175	4	79	83	258	273	68	12	11	12	11	16	14	16	92	82
Artillery	2d Cong. Dist.	4	46	50	----	24	24	74	77	68	5	5	5	8	8	6	8	45	80
		168	1920	2088	15	811	826	2,914	3,077	73	140	137	139	146	153	143	182	1,040	80

[3]

TABLE
OF
ENLISTMENTS AND DISCHARGES IN 1880.

ARTILLERY.

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1881.
First Platoon	7	10	10
Second Platoon	4	4	----
Total	11	14	10

FIRST REGIMENT.

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1881.
Non-Commissioned Staff and Band	24	23	2
Company A	10	4	7
Company B	4	11	6
Company C	18	25	10
Company D	17	13	12
Company E	28	43	4
Company F	8	21	19
Company G	11	15	13
Company H	8	27	10
Company I	9	7	----
Company K	12	14	2
Total	149	203	85

SECOND REGIMENT.

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1881.
Non-Commissioned Staff and Band	1	----	3
Company A	15	11	18
Company B	17	9	9
Company C	2	8	32
Company D	13	11	18
Company E	15	17	15
Company F	7	6	26
Company G	14	18	23
Company H	14	25	17
Company I	17	9	10
Company K	2	13	18
Total	117	127	189

Third Regiment.

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1880.
Non-Commissioned Staff and Band	3	3	1
Company A	16	17	16
Company B	16	23	6
Company C	10	8	23
Company D	11	4	8
Company E	12	18	16
Company F	27	20	12
Company G	13	24	7
Company H	11	17	17
Company I	12	1	2
Company K	8	10	----------
Total	139	145	108

Fourth Regiment.

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1881.
Non-Commissioned Staff and Band	1	1	3
Company A	7	15	15
Company B	8	9	16
Company C	3	2	20
Company D	6	15	17
Company E	10	20	17
Company F	60	11	----------
Company G	9	15	12
Company H	6	5	17
Company I	10	7	14
Company K	8	7	15
Total	128	107	146

Fifth Battalion (Colored).

	Enlisted.	Discharged.	Term of service expires previous to Dec. 1, 1881.
Non-Commissioned Staff	----------	----------	----------
Company A	----------	----------	----------
Company B	----------	8	----------
Company C	12	21	----------
Company D	4	1	----------
	16	30	

[4]

MILITARY ENROLLMENT.

HARTFORD COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
Hartford	5,714	4,086
Avon	132	87
Berlin	256	184
Bloomfield	169	114
Bristol	756	444
Burlington	158	116
Canton	353	255
East Hartford	463	288
East Granby	82	61
East Windsor	341	257
Enfield	672	425
Farmington	340	207
Glastonbury	381	243
Granby	216	180
Hartland	97	78
Manchester	781	500
Marlborough	43	30
New Britain	2,336	1,429
Newington	79	49
Plainville	288	228
Rocky Hill	79	55
Simsbury	240	181
Southington	638	463
South Windsor	286	223
Suffield	358	286
West Hartford	228	165
Wethersfield	222	113
Windsor	424	277
Windsor Locks	278	161
Total	16,410	11,185

TOLLAND COUNTY.

TOWNS.	Inactive Militia.	No. of persons assessed Commutation tax of $2.
Tolland	95	68
Andover	58	39
Bolton	58	48
Coventry	246	189
Columbia	72	61
Ellington	124	100
Hebron	120	97
Mansfield	179	140
Somers	173	135
Stafford	526	369
Union	71	47
Vernon	895	520
Willington	128	93
Total	2,745	1,906

NEW HAVEN COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
New Haven	9,634	6,019
Branford	414	266
Bethany	70	50
Beacon Falls	36	30
Cheshire	276	227
Derby	1,160	748
East Haven	504	292
Guilford	369	262
Hamden	363	264
Madison	212	145
Meriden	2,294	1.519
Middlebury	69	46
Milford	510	294
Naugatuck	649	518
North Branford	150	104
North Haven	239	148
Orange	399	232
Oxford	149	112
Prospect	71	53
Seymour	246	157
Southbury	181	121
Wallingford	755	364
Waterbury	2,352	1,305
Woodbridge	118	81
Wolcott	59	41
Total	21,279	13,398

MIDDLESEX COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
Middletown	1,521	925
Chatham	211	150
Chester	155	104
Clinton	154	100
Cromwell	201	136
Durham	132	79
East Haddam	337	260
Essex	275	179
Haddam	184	142
Killingworth	101	76
Middlefield	121	90
Old Saybrook	110	83
Portland	385	283
Saybrook	173	133
Westbrook	107	76
Total	4,167	2,816

NEW LONDON COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
New London	1,480	848
Norwich	2,591	1,473
Bozrah	84	65
Colchester	426	348
East Lyme	193	151
Franklin	68	43
Griswold	347	229
Groton	601	350
Lebanon	236	173
Ledyard	157	123
Lisbon	79	64
Lyme	148	108
Montville	321	240
North Stonington	247	177
Old Lyme	181	145
Preston	260	191
Salem	71	49
Stonington	846	460
Sprague	260	170
Waterford	308	209
Total	8,904	5,616

WINDHAM COUNTY.

TOWNS.	Inactive Militia.	No. of persons assessed Commutation tax of $2.
Windam	961	581
Ashford	157	119
Brooklyn	160	130
Canterbury	142	97
Chaplin	75	41
Eastford	98	75
Hampton	106	71
Killingly	758	455
Plainfield	296	235
Pomfret	161	106
Putnam	634	308
Sterling	104	83
Scotland	67	55
Thompson	385	244
Voluntown	101	71
Woodstock	292	207
Total	4,497	2,878

FAIRFIELD COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
Fairfield	394	293
Bethel	500	284
Bridgeport	4,264	3,120
Brookfield	113	94
Danbury	1,996	1,399
Darien	271	170
Easton	125	99
Greenwich	824	594
Huntington	273	179
Monroe	116	82
New Canaan	260	217
Newtown	391	298
New Fairfield	76	61
Norwalk	1,716	876
Reading	164	129
Ridgefield	217	164
Stamford	1,424	789
Stratford	615	375
Sherman	76	67
Trumbull	168	116
Weston	105	72
Westport	451	254
Wilton	155	121
Total	14,694	9,853

LITCHFIELD COUNTY.

TOWNS.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
Litchfield	494	330
Barkhamsted	123	89
Bethlehem	79	63
Bridgewater	83	68
Canaan	141	97
Colebrook	139	111
Cornwall	205	146
Goshen	118	86
Harwinton	107	68
Kent	173	130
Morris	85	62
New Hartford	399	305
New Milford	498	388
Norfolk	124	96
North Canaan	212	164
Plymouth	333	227
Roxbury	95	79
Sailsbury	393	268
Sharon	336	242
Torrington	472	310
Thomaston	342	240
Washington	194	145
Warren	72	56
Watertown	206	164
Winchester	761	430
Woodbury	329	266
Total	6,513	4,630

RECAPITULATION BY COUNTIES.

COUNTIES.	Inactive Militia.	No. of Persons assessed Commutation tax of $2.
Hartford	16,410	11,185
Tolland	2,745	1,906
New Haven	21,279	13,398
Middlesex	4,167	2,816
New London	8,904	5,616
Windham	4,497	2,878
Fairfield	14,694	9,853
Litchfield	6,513	4,630
Total	79,209	52,282

[5]

REPORTS

BRIGADE INSPECTOR,

BRIGADE INSPECTOR OF TARGET PRACTICE

AND

EXAMINING BOARD.

HARTFORD, CONN., November 10, 1880.

Lieut.-Colonel LEWIS L. MORGAN,

Brigade Adjutant, C. N. G.:

COLONEL—Agreeable to instructions contained in Special Order No. 8, dated Brigade Headquarters, C. N. G., Camp Fairchild, Niantic, Conn., dated August 23, 1880, I have the honor to transmit herewith report of my inspections of the Third and First Regiments, C. N. G., at the above encampment, August 26.

The camp was located on the same ground as in 1878 and 1879, demonstrating the desirability of that or a similar soil for this use.

I employ the same ratings as heretofore, viz: (0) Bad; (1) Poor; (2) Fair; (3) Good; (4) Excellent.

The inspection of the Third Regiment was preceded by a Review received by Colonel W. H. Tubbs, Commander. Review and Inspection was ordered at 10 a. m. Review began at 10:22. Inspection was concluded at 12:30 p. m. The wheelings were excellent (4); marching and alignments excellent (4); distances good (3).

I respectfully refer you to the following table, showing number present at inspection, condition of arms, equipments, etc.

Third Regiment.	Present at Inspection.	Aggregate on Rolls.	Aggregate paid for duty at Encampment.	Condition of Arms.	Condition of Equipments.	Condition of Clothing.	Condition of Knapsacks.	Quarters.
Field and Staff	10	10	10	4	4	4		4
Non-Commissioned Staff	6	6	6	4	4	4		4
Band	22	20	20					
Company A—Officers	2							
— Enlisted men	33	55	53	2	2	4	4	
Company B—Officers	2							
— Enlisted men	29	60	46	3	3	4	4	
Company C—Officers	3							
— Enlisted men	29	58	48	3	3	4	4	
Company D—Officers	3							
— Enlisted men	25	53	46	2	2	4	4	
Company E—Officers	2							
— Enlisted men	26	60	53	2	2	4	4	
Company F—Officers	2							
— Enlisted men	41	68	63	1	2	4	4	
Company G—Officers	1							
— Enlisted men	38	62	56	2	2	4	4	
Company H—Officers	1							
— Enlisted men	31	58	54	2	2	4	4	
Company I—Officers	2							
— Enlisted men	34	64	54	2	3	4	4	
Company K—Officers	3							
— Enlisted men	27	66	46	2	2	4	4	
Total	371	640	555					

The unsling and sling knapsacks by Co. B was excellent (4). The overcoats of Co. C were rolled in an excellent manner (4).

The inspection of the First Regiment was preceded by a Review received by Colonel L. A. Barbour, Commander. Review was ordered at 2 p. m. Review began at 2 p. m. The wheelings were excellent (4); marching and alignments excellent (4); distances good (3). The manner in which the Review of the First Regiment was executed has not, in my observation or experience, been excelled.

I submit table showing number present at inspection, condition of arms, etc.:

First Regiment.	Present at Inspection.	Aggregate on Rolls	Aggregate paid for duty at Encampment.	Condition of Arms.	Condition of Equipments.	Condition of Clothing.	Condition of Knapsacks.	Quarters.
Field and Staff	10	10	10	4	4	4		4
Non-Commissioned Staff	6	6	6	4	4	4		4
Band	21	19	19		3	3		3
Company A—Officers	1							
— Enlisted men	50	66	59	2	3	4	4	3
Company B—Officers	3							
— Enlisted men	48	66	60	3	3	4	4	3
Company C—Officers	3							
— Enlisted men	28	55	45	3	2	4	4	3
Company D—Officers	3							
— Enlisted men	44	68	65	3	3	4	4	3
Company E—Officers	3							
— Enlisted men	40	67	66	4	4	4	4	4
Company F—Officers	3							
— Enlisted men	48	69	58	4	4	4	4	4
Company G—Officers	2							
— Enlisted men	34	59	48	3	3	4	4	3
Company H—Officers	3							
— Enlisted men	40	66	61	3	3	4	4	3
Company I—Officers	3							
— Enlisted men	41	56	50	3	2	4	4	3
Company K—Officers	3							
— Enlisted men	56	79	65	4	4	4	4	4
Total	493	686	615					

In the First Regiment, 615 were paid for duty at encampment; 493 were inspected; absent from inspection, 122. These absentees were: Guard detail, 48 men; detailed on special duty, 33 men; sick, 19; balance unaccounted for, 22 men, making 96 per cent. of men available, on duty.

The number paid for duty at encampment as compared with number on rolls is:

Third Regiment, ... $87\frac{5}{10}$ per cent.
First Regiment, ... $89\frac{6}{10}$ per cent.

The number present at inspection as compared with number paid for duty at encampment is:

Third Regiment, ... 67 per cent.
First Regiment, ... $80\frac{4}{10}$ per cent.

All not present are reported as absent, though many

were detailed for guard duty, special duty, and many were on sick list.

Camp Fairchild was a clean camp, and policing was well done.

Taps were fairly observed.

Guard duty was also fairly performed.

Drills, both company and battalion, were well attended and promptly began. I am of the opinion that the time allotted to battalion drill, one and one-half hours, is full long. A continuous, sharp drill of one hour is far more beneficial than one and a half hours, which is usually attended by long rests.

Regarding courtesy of men to officers and officers to men, I did not observe much improvement over the encampment of 1879.

The wearing of badges has not received the attention from some source that it demands. Those issued by the State to marksmen should have a place of wearing designated, for uniformity. Instructions should be issued as to how to roll overcoats.

I would call your attention to Private Thomas W. Gleason, Company K, First Regiment, for the efficient and very soldierly manner in which he performed the duties of Orderly at Brigade Headquarters. I have never seen it equaled. Space does not admit of my mentioning many other members of both regiments whom I would desire to.

The presence of Lieut.-Colonel Roger Jones, of the Inspector-General's Department, U. S. A., detailed at the request of the Commander-in-Chief to attend this encampment, was not without good results, and the able and complimentary report of Colonel Jones to the Hon. Secretary of War as to the condition of these two regiments and two platoons of Light Artillery must be highly gratifying to General Smith and his regimental and artillery commanders.

I am, Sir, very respectfully, your obedient servant,

JOHN B. CLAPP,

Major, and Brigade Inspector, C. N. G.

ABSTRACT

OF

CONSOLIDATED MORNING REPORTS FOR ENCAMPMENT,

AUGUST 23–28, 1880.

First Regiment.

Company.	Monday.		Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.	
	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.	Present.	Absent.
Field, Staff and Band	35	----	35	----	35	------	35	----	35	----	35	------
Company A	58	8	58	8	58	8	59	7	59	7	59	7
" B	60	6	60	6	60	6	60	6	60	6	60	6
" C	47	8	46	9	48	7	48	7	48	7	48	7
" D	66	2	65	3	65	3	65	3	64	4	65	3
" E	66	1	66	1	66	1	65	2	65	2	66	1
" F	49	20	51	18	51	18	58	11	59	10	58	11
" G	46	13	44	15	46	13	48	11	49	10	49	10
" H	60	6	61	5	60	6	60	6	60	6	61	5
" I	49	7	50	6	49	7	50	6	52	4	52	4
" K	57	22	57	22	59	20	65	14	64	15	63	16
	593	93	593	93	597	89	613	73	615	71	616	70

Third Regiment.

Field, Staff and Band	36	----	36	----	36	------	36	------	36	----	36	------
Company A	54	1	52	3	53	2	51	4	49	6	49	6
" B	46	14	50	10	46	14	46	14	46	14	46	14
" C	55	3	54	4	55	3	55	3	55	3	55	3
" D	46	7	46	7	46	7	46	7	46	7	46	7
" E	52	8	52	8	52	8	51	9	52	8	52	8
" F	63	5	61	7	63	5	63	5	63	5	63	5
" G	55	7	55	7	55	7	55	7	55	7	55	7
" H	55	3	55	3	55	3	55	3	55	3	55	3
" I	52	12	53	11	54	10	53	11	53	11	53	11
" K	49	17	46	20	47	19	46	20	46	20	46	20
	563	77	560	80	562	78	557	83	556	84	556	84

Artillery Platoons.

First Platoon	35	4	36	3	36	3	36	3	36	3	36	3
Second Platoon	33	2	34	1	34	1	34	1	34	1	34	1
	68	6	70	4	70	4	70	4	70	4	70	4

BRIGADE HEADQUARTERS, C. N. G.
NEW HAVEN, CONN., NOV. 15, 1880.

Brigadier-General EDWARD HARLAND,
Adjutant-General, State of Connecticut:

GENERAL,—In compliance with General Orders, No. 2, dated Hartford, March 30, 1878, I have the honor to submit my report of the Target Practice in this Brigade for the year 1880, together with the list of those qualifying as marksmen and entitled to receive the State badges. I regret to say that owing to a number of indirect influences there has not been as much interest shown in the annual practice as in 1879, with the exception of the 1st Regiment, who have (as shown by their report) been very thorough in their work, as well as in the keeping of reports, and collections of statistics. I think we may look upon their results as proofs of the perfection of our present system, and that the ends to be desired, in this branch of our service, can be attained by all organizations that will carry out its prescribed rules. I do not doubt but that your action in presenting the marksmen's badges will create a new interest and incentive in years to come.

I trust that before another season there will be a new rear sight (with wind guage) adopted and issued; this should be done during the winter months, and when the sights or gun can be withdrawn for the change to be made and be in readiness for the next season's work. I do not hesitate to say that in this respect only, are our arms inferior to those of any other State, and that the proposed change would not only add greatly to the efficiency of the arm, but would do much towards encouraging Target Practice and place us more in equality with representatives of other States when brought in competition with them. I believe the present arrangements of providing target facilities and of issuing ammunition to be perfectly satisfactory and that in respect to those com-

panies that do not carry out the system of practice, the fault is not with the State but generally with the officers in command.

I would call your attention to the great benefits derived from armory practice and drill during the winter months; and believe that the results, especially to those who have not received practice in the field, that would accrue from a small expenditure in a suitable cartridge (that could be used in the regular arm) and issued to every command, would be far greater than a much larger amount expended in the field and with less loss of time to the men.

I include in this report some statistics taken from the meetings of the Brigade outside the regular annual practice as indicating the degree of proficiency arrived at, in comparison with representatives of other States and organizations as well as among ourselves, and observations suggested by them.

REPORT OF CREEDMOOR MEETING.

A strong desire was shown throughout the Brigade that our State should be represented in the Inter-State and Inter-National Matches given at Creedmoor by the National Rifle Association, which resulted in the sending of volunteer teams from each of the 1st, 2d and 4th Regiments, each individual bearing his own expenses.

These teams entered the Army and Navy match as Regimental teams, and from which a team was selected (without competition) to represent the State in the Inter-State match.

By instructions from Brig.-Gen. S. R. Smith, I took command of these men (50 or more) while encamped at Creedmoor, the State of New York furnishing wall tents floored; our Quartermaster-General, overcoats, blankets, and small camp equipage. We were in camp from Tuesday morning until Thursday night. The conditions of the Army and Navy match were, Teams of 12 men from any Regiment or organization in the United States. Shots, 7. Distance, 500 yards; possible team total, 420 points.

There were 19 entries, the position of our Regimental teams were as follows:

1st Regiment,	9th place.	Score	305.
4th "	11th "	"	295.
2d "	12th "	"	291.

Our State team was composed of 6 men from 1st Regiment, 4 men from 2d Regiment, and 2 men from 4th Regiment. Conditions were, 12 men, 10 shots each at 200 and 500 yards, possible score 1200. In the previous Inter-State matches, Connecticut, has stood as follows:

	1st.	States represented.
1875—2d place. Score, 683.	N. Y.	N. Y. and Conn.
1876—1st " " 829.	Conn.	N. Y. and Conn.
1877—2d " " 971.	Cal.	Cal., N. Y., N. J. and Conn.
1878—2d " " 906.	N. Y.	N. Y., N. J., R. I., Mass. and Conn.
1879—Not represented.		
1880—2d place. Score, 933	N. J.	N. Y., N. J., Penn. and Conn.

The score of the Connecticut team was as follows:

	200 yds.	500 yds.	Total.
E. H. Williams, Private, F, 1st	44	39	83
E. W. Whitlock, Private, E, 2d	39	43	82
J. L. Woodbridge, Capt. and I. T. P., 1st	41	41	82
G. G. LaBarnes, 1st Lt., K, 2d	38	42	80
J. L. Osgood, 2d Lt., E, 1st	42	38	80
H. Nichols, Q. M. Sergt., 4th	38	41	79
F. P. Thompson, Corp., K, 4th	38	41	79
H. Atkinson, 1st Sergt., K, 2d	38	37	75
G. R. Nichols, Private, E, 2d	42	32	74
H. Simon, Jr., 2d Lt., H, 1st	33	41	74
F. V. Chapin, Sergt., H, 1st	36	38	74
G. B. Newton, Corp., F, 1st	40	31	71
	469	464	933

In the Inter-National Match the same team represented this State. It is but justice to ourselves to say that all the Regular Army Team were completely organized and used special Springfield rifles with the best wind guage sights and special ammunition of much

greater weight than our regular ammunition, and that the team from New Jersey used a special Sharp's Borchardt rifle with special ammunition, and that our team was selected and entered the matches without organization or team practice; while perhaps there never was as thorough organization in military teams as in those who opposed us in this match. Owing to one stage of the match being shot at a range where we had no practice (600 yards), our standing was not as good in this match as at our usual ranges 200 and 500 yards. The conditions of this match were, 12 men, 7 shots each, at 200, 500, and 600 yards, possible score 1260.

Total as follows:

	200 yds.	500 yds.	600 yds.	Total.
Military division Missouri,	342	364	317	1023
" " Atlantic,	334	363	317	1014
" " Pacific,	334	348	322	1004
State of New Jersey,	335	317	317	969
" Connecticut,	341	336	282	959
" Pennsylvania,	334	331	289	954

SCORE OF CONNECTICUT TEAM.

	200 yds.	500 yds.	600 yds.	Total.
H. Atkinson,	28	34	24	86
E. H. Williams,	30	28	26	84
G. Nichols,	29	30	25	84
E. W. Whitlock,	30	29	25	84
G. B. Newton,	29	26	27	82
H. Simon,	30	29	23	82
F. P. Thompson,	26	29	25	80
J. L. Woodbridge,	30	21	28	79
G. G. LaBarnes,	24	29	25	78
F. V. Chapin,	30	29	19	78
J. L. Osgood,	29	26	18	73
H. Nichols,	26	26	17	69
	341	336	282	959

In addition to this team work, many of our men entered the Individual Match, in which we won 12 of the 65 prizes offered in the Judd and Short Range matches.

REPORT OF ANNUAL FALL COMPETITION.

I am happy to state that the second annual Brigade fall meeting, instituted last year, was held Oct. 20 and 21, at Quinnipiac Range, New Haven, and though we labored under many adverse influences, not the least of which was obtaining suitable prizes, the meeting resulted in a good attendance and a high degree of marksmanship of those attending. Through the liberality of a few friends and careful management we were enabled to present 43 prizes, valued at over $650, and divided as follows:

Individual	list	30	Prizes valued	$130.
Company Team	"	11	" "	325.
Regimental Team	"	2	" "	205.

The entries were, on Individual Match,	219.
" " " " Company Team Match,	19.
" " " " Regimental Match,	3.

THE INDIVIDUAL MATCH.

The shooting in this match was remarkably good, the first and second prizes being won by a score of 33, 94 per cent. of possible, and no prizes being won on less than 83 per cent. and 20 scores of 83 per cent. did not receive prizes.

The first prize was won by Sergeant J. W. Crane, H, 1st Regt.,	33 points.
The second prize was won by Private E. W. Whitlock, E, 2d Regt.,	33 points.
The third prize was won by Sergeant F. V. Chapin, H, 1st Regt.,	32 points.

The distribution of prizes was as follows:

2d Regiment,	9 prizes.	2d Co. Gov. Foot Guards,	1 prize.
1st "	8 "	3d Regiment,	2 prizes.
4th "	5 "	Total,	28.
1st Co. Gov. Foot Guards,	3 "		

THE COMPANY TEAM MATCH.

19 teams entered as follows:

1st Regiment,	6 teams.	1st Co. Gov. Foot Guards,	1 team.
2d "	6 "	2d " "	1 "
4th "	4 "	Co. A, Fifth Battalion,	1 "

The conditions were teams of 8 men, 7 shots each at

200 and 500 yards, possible score 560. The result of the company team match was as follows:

	200 yds.	500 yds.	Total.
Co. E, 1st Regiment, New Britain,	219	195	414
Co. K, 2d " Wallingford,	193	211	404
Co. I, 2d " Meriden,	210	192	402
Co. F, 1st " Hartford,	200	193	393
Co. H, 1st " Hartford,	199	189	388
Co. G, 1st " South Manchester,	205	182	387
Co. A, 2d " Waterbury,	200	185	385
Co. K, 1st " Hartford,	192	187	379
Co. K, 4th " Stratford,	186	192	378
Second Co. Gov. Foot Guard, New Haven,	196	163	362
Co. B, 4th Regiment, Bridgeport,	199	159	358
Co. E, 2d " New Haven,	189	166	355
Co. F, 2d " New Haven,	203	130	333
First Co. Gov. Foot Guard, Hartford,	196	128	324
Co. B, 1st Regiment, Hartford,	183	121	304
Co. D, 2d " New Haven,	158	119	277
Co. A, Fifth Battalion, New Haven,	148	83	231
Co. D, 4th Regiment, South Norwalk,	131	84	215
Co. F, 4th " Norwalk,	130	68	198

REGIMENTAL TEAM MATCH.

Three Regiments entered the Regimental Team Match, viz: First, Second and Fourth. Conditions were, 12 men, 10 shots each at 200 and 500 yards. The scores were as follows:

SECOND REGIMENT.

	200 yds.	500 yds.	Total.
Lieut. G. G. LaBarnes, Co. K	36	41	77
Sergt. H. Atkinson, Co. K	38	47	85
Corp. A. E. Hobson, Co. K	42	41	83
Priv. H. Jones, Co. K	31	40	70
Priv. W. H. Talcott, Co. K	38	31	69
Capt. H. J. Bacon, Co. H	33	42	75
Sergt. C. S. Crampton, Co. A	40	36	76
Sergt. F. L. Waples, Co. K	37	45	82
Lieut. J. N. Lane, Co. I	42		42
Priv. James Tinkey, Co. E	39		39
Priv. E. W. Whitlock, Co. E	40		40
Priv. G. R. Nichols, Co. E	39		39
	455	323	778

FOURTH REGIMENT.

	200 yds.	500 yds.	Total.
Maj. G. F. Lewis, Surgeon	38	35	73
Priv. H. Porter, Co. K	34	40	74
Corp. Geo. Stearns, Co. B	37	39	76
Sergt. C. A. Blakeman, Com. Sergt.	42	41	83
Sergt. Chas. E. Beers, Co. B	34	39	73
Lieut. W. Van Yorx, Co. B	37	42	79
Sergt. Bruce H. Weller, Co. K	39	32	71
Sergt. James S. Hubbell, Co. K	39	43	82
Capt. S. C. Kingman, I. T. P.	36		36
Priv. A. W. Porter, Co. K	34		34
Sergt. H. Nichols, Q. M. Sergt.	40		40
Corp. Fred. P. Thompson, Co. K	38		38
	448	311	759

FIRST REGIMENT.

	200 yds.	500 yds.	Total.
Capt. J. L. Woodbridge, I. T. P.	43	34	77
Lieut. H. Simon, Jr., Co. H	39	39	78
Lieut. J. L. Osgood, Co. E	40	43	83
Capt. C. B. Erichson, Co. E	39	9	48
Sergt. F. V. Chapin, Co. H	37	43	80
Corp. W. H. McLean, Co. H	35	44	79
Priv. S. G. Tracy, Co. K	36	36	72
Priv. W. P. Barber, Co. F	40	29	69
Sergt. A. L. Thompson, Co. E	37		37
Corp. T. A. McConkey, Co. E	40		40
Corpl. G. B. Newton, Co. F	42		42
Priv. E. H. Williams, Co. F	43		43
	471	277	748

It is to be regretted that it became so dark before this match was completed that the teams were compelled to stop shooting, and by the decision of the Committee of Reference and Appeal it was decided to throw out the four last scores at 500 yards of each team, part of which were incomplete, and consider the remaining as the official score.

Special contributions of prizes were as follows:

Derby Silver Co., Trophy, value,	$150.00
Baker & McKenney, New York,	50.00
Generals on the Governor's Staff,	50.00
Company F., Second Regiment,	10.00
Boylan & Co., New York,	50.00
Foskett & Bishop, New Haven, pair Bronzes,	25.00
Company K, Fourth Regiment,	10.00
Second Co. Governor's Foot Guards,	10.00
Winchester Arms Co., Rifle, value,	30.00
Major Thos. L. Watson, Cigar stand and Ash Receiver, value,	10.00
J. M. Marlin, New Haven, pearl handled Revolver, value,	15.00

I trust these meetings will be continued, and think the State should encourage them by the presentation of a few State prizes for annual competition.

ARTILLERY TARGET PRACTICE.

For the first time (at least in this State) the 1st Platoon of Artillery, stationed at Guilford, held a target practice under as scientific principles as was possible under the circumstances, and I think some of the results worthy of your notice. The two guns issued to this command were bought by the State in 1862, and are rifled brass pieces, weighing respectively, No. 1, 869 lbs., No. 2, 872 lbs., the entire length of bore is $57\frac{1}{2}$ inches, diameter $3\frac{3}{16}$ inches, they are fitted with front and rear sights, the rear graduated in degrees. The carriages upon which the pieces are mounted are too light, as was shown by the breaking of the axle during the practice on No. 2 gun. The ammunition used was issued by the State, the powder being the same used in United States service for guns of this caliber and had been made into cartridges of $1\frac{1}{2}$ lbs. weight. We had no time to experiment upon different charges which would have undoubtedly given interesting results, but could not have changed some of the conclusions arrived at. The balls were conical, of two kinds, the Hotchkiss being made in two parts with a lead sabot between the two, and upsett by their actions and weighing $12\frac{3}{4}$ lbs. The other a much larger shot with brass sabot on base and weighing $19\frac{3}{4}$ lbs. I am

satisfied that neither is suitable for use in these guns, the diameter being but $3\frac{10}{16}$ inches, giving a windage of $\frac{3}{16}$ inches to be filled by upsett, and our practice proves that (at least in the case of the larger shot) they seldom catch the rifling, and if they did the ball did not center on its axis and receive a perfectly steady flight; and though the lighter (12¾ lbs.) ball was in the better proportion to the weight of gun and charge of powder, still the result shows much the greater variations owing I think greatly to the extreme amount of windage. In the case of the heavier ball (19¾ lbs.) by data of range (950 yards), average elevation (4½°) and time (3.8 seconds), computed from these by means of formula used by United States and English armies. The initial velocity was found to be 831 feet per second, and at target 709 feet. The initial velocity should have been, to insure greatest accuracy, at least 1300 feet per second, proving our charge of powder far too small; but by other formula we find that to produce such a velocity would require 4 lbs. of powder, which it is evident neither the gun or carriage could stand safely. The weight of guns of this caliber (viz: $3\frac{13}{16}$ inches) is given as from 1300 to 1400 lbs., 50 per cent. more than the weight of these (870 lbs.). These facts should condemn any ball of this weight for use in these guns. We came therefore to the conclusion that the guns require a conical ball, weighing from 12 to 15 lbs., of proper diameter and similar form, and with a charge of 3 lbs. of powder would guarantee an initial velocity of from 1100 to 1300 feet per second, which in my opinion would be the maximum pressure the guns could safely stand. The target used was of canvas 12 feet square, with a three-foot bull's eye, placed at 950 yards range by trigonometrical measurement. I would here acknowledge the great assistance of a detachment of the Signal Corps from Gen. Russell's military school under command of Major Stowe, part of this detachment being placed at the target and part at firing point. Every shot was measured and the result given, by the very simple and perfect manner the system affords;

and after seeing its workings upon this occasion I can most heartily endorse the report and recommendations of Major Stowe upon this subject made to you from Brigade encampment at Niantic, Aug. 27, 1880.

RESULT OF 40 SHOTS FIRED.

No. Gun.	No. Shot.	Weight Powder.	Weight Shot.	Elevation.	Short.	Beyond.	Right.	Left.	From center of target. Low.	High.
2	1	1½ lbs.	12¾ lbs.	2°	Very much				Low.	
2	2	"	"	2½°	300 ft.				31 ft.	
2	3	"	"	3°	300 ft.			75 ft.	31 ft.	
2	4	"	"	4°	80 ft.			80 ft.	14 ft.	
2	5	"	"	4½°	30 ft.		20 ft.		10 ft.	
2	6	"	"	"		200 ft.	25 ft.			7 ft.
1	7	"	"	"	300 ft.		70 ft.		31 ft.	
1	8	"	"	"		150 ft.		30 ft.		6½ ft.
1	9	"	"	"	Very low					
1	10	"	"	"		400 ft.		10 ft.		22½ ft.
2	11	"	19¾ lbs.	5½°		300 ft.	Line.			15 ft.
2	12	"	"	5°		200 ft.	Line.			7 ft.
2	13	"	"	4½°	250 ft.		12 ft.		27 ft.	
2	14	"	"	4°	Very low, axle of piece checked.					
2	15	"	"	4¼°	240 ft.				26 ft.	
2	16	"	"	4½°	8 ft.		Line.		8 ft.	
2	17	"	"	"		Shot tumbled, fell very short.				
2	18	"	"	"		"	"	"	"	
1	19	"	"	4½°	60 ft.		8 ft.		12 ft.	
1	20	"	"	4¾°		300 ft.	Line.			15 ft.
1	21	"	"	4⅝°					Bulls eye.	
1	22	"	"	"	240 ft.			10 ft.	26 ft.	
1	23	"	"	"		Shot tumbled very short.				
1	24	"	"	"	On target		3 ft.			2 ft.
1	25	"	"	"	75 ft.			10 ft.	13½ ft.	
1	26	"	"	"	55 ft.		12 ft.		12 ft.	
1	27	"	"	"		200 ft.	12 ft.			7 ft.
1	28	"	"	"		200 ft.	10 ft.			7 ft.
1	29	"	"	"		200 ft.	Line.			7 ft.
1	30	"	"	4½°	80 ft.		Line.		14 ft.	
1	31	"	12¾ lbs.	"	Very high. not measured.					
1	32	"	"	3½°	"	"	"			
1	33	"	"	"	Tumbled, fell very short.					
1	34	"	"	"	Highest shot, about 300 yds. beyond.					
1	35	"	"	4⅝°	275 ft.				27 ft.	
1	36	"	"	"	Tumbled, fell short.					
1	37	"	"	4⅔°	On target, 5 ft. left of center.					
1	38	"	"	"	" 2 ft. under. "					
1	39	"	"	"		225 ft.	10 ft.			9 ft.
1	40	"	"	"		Tumbled.				

SUMMARY.

$12\frac{8}{4}$ lb. ball, 20 shots fired, 8 shots so bad not measured. Of the remaining 12 : 7 went low, 4 high, 1 correct elevation.
4 to the right, 4 left, 4 in line.

7 low	shots averaged	$20\frac{6}{7}$	feet	under	center of	target.
4 high	" "	$11\frac{1}{4}$	"	over	"	"
4 right	" "	$31\frac{1}{4}$	"	right	"	"
4 left	" "	$47\frac{1}{2}$	"	left	"	"

Average total deviation in elevation, 12 shots, 16 feet.
" " " " line " " $26\frac{1}{4}$ "

$19\frac{8}{4}$ lb. ball, 20 shots fired, 3 shots not measured, of the remaining 17 :

8 low	shots averaged	$17\frac{1}{4}$	feet	under	center of	target.
8 high	" ."	$10\frac{1}{4}$	"	over	"	"
1	" correct elevation.					
6 right	" averaged	$9\frac{1}{2}$	feet	right	"	"
3 left	" "	10	"	left	"	"
7	" were in good line of target.					

Average total deviation in elevation 17 shots, 13 feet.
" " " " line " 5 "

I am informed by Lieut. Lee commanding this Platoon that they have never fired shell or grape, and that they have never had issued to them any ammunition to be retained in their armory in case of need, and even the State Arsenal is not constantly supplied with ammunition for their use. The members of this platoon as well as Lieut. Lee, Commander, are very much interested in this work and hope the results obtained will be followed up and efficiency thereby improved.

The list of marksmen for 1880 and their scores, together with a few statistics of the year's work, is appended hereto.

I have the honor to be, General,

Your obedient servant,

JAMES E. STETSON,

Major and Brigade Inspector Target Practice, C. N. G.

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
BRIGADIER-GENERAL AND STAFF (*New Haven*):					
Brig.-Gen. Stephen R. Smith	4 4 4 3 4	19	3 3 3 3 3	15	34
Lieut.-Col. Lewis L. Morgan	4 4 4 4 4	20	4 3 3 3 4	17	37
Major Thomas L. Watson	4 3 5 4 3	19	4 5 4 5 3	21	40
Major James E. Stetson	4 4 4 4 5	21	4 4 5 4 4	22	43
Total, 4. Average score	19.75		18.75		38.50
FIRST REGIMENT:					
Field and Staff (*Hartford*).					
Colonel Lucius A. Barbour	4 3 5 3 4	19	5 3 5 5 5	23	42
Lieut.-Col. William E. Cone	4 3 3 3 2	15	4 2 3 4 3	16	31
Major Arthur L. Goodrich	3 5 3 5 5	21	4 5 2 4 5	20	41
Capt. & Adj. John K. Williams	5 4 4 5 4	22	5 4 4 5 5	23	45
1st Lt. & Paym'r Wm. B. McCray	5 5 5 3 4	22	5 5 5 2 4	21	43
1st Lt. & Asst. Surg. H. G. Howe	4 4 4 5 4	21	4 3 5 4 5	21	42
Capt. & I. T. P. J. L. Woodbridge	5 5 5 4 4	23	5 5 5 5 4	24	47
Q. M. Sergt. J. D. Worthington	4 5 4 3 5	21	2 4 0 3 4	13	34
Com. Serg. Wallace T. Fenn	4 5 3 4 4	20	5 3 5 4 5	22	42
Hosp. Steward Philo W. Newton	4 4 3 3 4	18	5 4 0 4 2	15	33
Drum Major William C. Steele	3 3 3 4 4	17	4 5 3 4 3	19	36
Total, 11. Average	19.91		19.72		39,63
Company A (*Hartford*).					
Captain William Westphal	3 3 0 4 4	14	4 3 3 3 3	16	30
1st Lieutenant Edward Schulze	2 3 3 4 4	16	2 5 3 5 4	19	35
1st Sergeant Cuno A. Helfricht	3 4 5 3 4	19	4 4 4 0 2	14	33
Sergeant Emil Schmidt	3 4 4 2 4	17	0 2 3 2 3	10	27
Sergeant George Neuschäfer	4 4 2 4 3	17	4 5 4 0 4	17	34
Sergeant Amos Brumbaum	3 2 2 3 4	14	2 3 3 3 2	13	27
Corporal James P. Brennan	3 5 3 0 2	13	5 3 0 4 0	12	25
Corporal Jacob B. Sprewenberg	3 4 0 5 3	15	2 4 3 3 0	12	27
Corporal James W. Camp	4 4 3 4 4	19	2 4 2 2 3	13	32
Corporal Charles Fisher	3 5 4 3 0	15	0 3 5 3 5	16	31
Private George Brand, Jr.	4 3 4 0 4	15	4 2 2 0 5	13	28
Private Charles F. Bodenstein	3 3 0 2 5	13	5 2 2 0 4	13	26
Private Frederick H. Bacon	4 5 3 2 3	17	2 3 4 5 3	17	34
Private Frank A. Connolly	4 3 3 2 0	12	3 3 3 2 2	13	25
Private Frank Gropp	4 0 3 3 3	13	0 2 5 5 4	16	29
Private Frederick A. Hatch	4 2 3 2 2	13	0 4 2 4 2	12	25
Private William W. Keller	3 2 3 2 3	13	3 0 2 5 4	14	27
Private George Lind	5 2 3 4 2	16	2 4 5 0 2	13	29
Private Otto Sickmann	4 4 4 2 0	14	2 5 4 0 2	13	27
Private Thomas R. Swift	4 5 4 3 4	10	3 4 4 3 4	18	38
Private Henry A. Swift	3 4 3 4 4	18	4 5 3 3 3	18	36
Private Alfred Teweles	4 3 2 5 3	17	3 0 4 0 3	10	27
Private Franz C. E. Witte	2 4 3 0 4	13	4 0 4 5 5	18	31
Total, 23. Average	15.35		14.34		29.69

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Company B (Hartford).					
Captain Patrick J. Moran	4 4 4 4 4	20	4 4 5 5 4	22	42
1st Lieut. Thomas J. Flannigan	4 2 4 4 4	18	0 5 0 3 0	8	26
2d Lieut. Patrick H. Smith	3 3 4 3 3	16	0 5 0 2 3	10	26
1st Sergeant John J. Leahy	3 3 2 3 3	14	4 5 2 4 0	15	29
Corporal James D. Dunn	0 3 2 4 3	12	4 0 2 3 4	13	25
Corporal John J. Dahill	2 4 3 0 3	12	5 4 3 3 5	20	32
Corporal Patrick B. McGivney	5 2 4 4 3	18	5 2 0 0 2	9	27
Corporal James Cunningham	2 3 2 3 4	14	2 4 2 0 3	11	25
Corporal John F. Lawler	3 4 2 3 3	15	4 2 5 5 3	19	34
Corporal John Broderick	2 3 3 4 0	12	3 5 3 0 3	14	26
Private Reuben Bishop	2 0 4 4 3	13	4 2 3 3 0	12	25
Private James Crane	3 3 3 3 2	14	3 3 2 3 0	11	25
Private John Coakley	3 5 2 2 3	15	0 2 5 4 3	14	29
Private John J. Cassidy	3 4 2 0 4	13	3 3 5 3 3	17	30
Private Robert Fallon	4 0 4 2 4	14	3 2 4 2 2	13	27
Private John Hurley	3 3 4 4 2	16	5 0 3 3 2	13	29
Private Florance Meafoy	0 2 2 4 4	12	3 5 4 2 3	17	29
Private John McCarthy, Jr.	3 3 4 5 3	18	3 2 3 4 0	12	30
Private Thomas E. McCann	2 4 2 3 4	15	4 0 5 0 3	12	27
Private Patrick A. McCann	4 4 4 3 3	18	2 5 4 3 3	17	35
Private Robert McGonigal	2 2 2 5 2	14	3 3 3 2 0	11	25
Private John McLaughlin	4 2 3 0 4	13	4 5 3 2 0	14	27
Private John J. O'Neil	4 2 0 4 4	14	3 2 2 5 0	12	26
Private James Roper	3 0 4 3 2	12	5 0 4 2 2	13	25
Private William Sparks	4 3 0 2 4	13	3 5 5 4 3	20	33
Private Thomas J. Whalen	2 3 3 3 4	15	4 2 2 0 2	20	25
Private Michael T. Ward	3 2 3 4 5	15	3 0 5 0 3	10	25
Total, 27. Average	14.63		13.66		28.29
Company C (Rockville).					
Captain Thomas J. Rigney	3 3 4 3 5	18	3 4 0 3 3	13	31
2d Lieutenant John Abbey	4 4 3 3 3	17	3 3 5 4 0	15	32
1st Sergeant John Gough	3 3 4 3 5	18	0 4 3 6 3	10	28
Sergeant John Kress, Jr.	2 3 4 4 4	17	0 2 3 4 0	9	26
Sergeant Frederick Kress	3 4 4 4 3	18	3 2 4 0 2	11	29
Corporal Edwin L. Bolles	4 2 4 5 3	18	2 0 0 4 4	10	28
Corporal Robert Geckler	3 0 4 3 4	14	2 4 5 3 3	17	31
Corporal Peter E. Faller	4 3 4 2 3	16	4 2 3 0 2	11	27
Corporal Walter A. Bruce	2 4 3 3 5	17	2 0 3 2 4	11	28
Private Joseph F. Hammond	3 4 4 0 4	15	3 0 4 4 2	13	28
Total, 10. Average	16.80		12.00		28.80
Company D (New Britain).					
Captain Augustus N. Bennett	5 4 3 3 3	18	4 4 3 3 5	19	37
2d Lieutenant William H. Parr	3 4 3 5 4	19	4 4 5 4 4	21	40
1st Sergeant William E. Allen	4 5 4 3 4	20	5 3 3 5 4	20	40
Corporal Alfred R. Parr	3 5 4 5 5	22	4 5 2 4 4	19	41
Private Michael J. McCarthy	4 0 3 2 4	13	3 3 3 4 4	17	30
Total, 5. Average	18.40		19.20		37.60

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES--CONTINUED.

Names.	200 Yards.	Tolal.	500 Yards.	Total.	Aggregate.
Company E (New Britain),					
Captain Charles B. Erichson	5 4 4 5 3	21	4 5 5 5 5	24	45
1st Lieut. Fred M. Hemenway	3 2 2 2 3	12	5 3 4 3 4	19	31
2d Lieut. J. Lester Osgood	5 5 5 5 5	25	5 5 5 5 5	25	50
1st Sergeant George O. McLean	4 4 5 5 5	23	4 5 5 4 4	22	45
Sergeant Charles F. Hartman	3 3 4 3 3	16	3 3 3 4 5	18	34
Sergeant Frederick W. Carnell	5 3 4 5 3	20	4 5 3 5 0	17	37
Sergeant Alfred L. Thompson	4 5 5 4 5	23	5 5 5 5 5	25	48
Sergeant Arthur G. Judd	3 4 2 4 2	15	0 3 4 4 2	13	28
Corporal Andrew M. McBrayne	4 3 4 0 4	15	2 3 4 3 4	16	31
Corporal John P. Gorman	3 4 3 4 5	19	4 3 3 4 2	16	35
Corporal William A. Dwight	5 5 3 3 3	19	2 5 4 3 5	19	38
Corporal Thomas A. McConkey	4 4 5 4 5	22	5 5 3 5 5	23	45
Corporal John Young	3 3 4 3 5	18	0 2 3 3 2	10	28
Corporal Henry E. Porter	2 3 3 3 3	14	4 4 4 3 4	19	33
Corporal Frederick C. Wilson	5 4 0 4 3	16	4 2 3 3 3	15	31
Musician William T. Bower	3 2 3 4 2	14	4 3 0 4 4	15	29
Musician Irwin E. Hubbard	3 3 2 4 3	15	4 3 3 3 0	13	28
Private Samuel G. Alexander	3 3 3 4 0	13	3 4 5 0 3	15	28
Private Herbert Brown	4 3 4 4 4	19	4 3 4 5 5	21	40
Private Frederick Brown	0 3 4 3 4	14	3 3 3 4 4	17	31
Private William G. Burg	3 3 3 4 3	16	0 2 3 3 5	13	29
Private Charles H. Bower	3 4 2 4 3	16	5 3 4 4 4	20	36
Private Frederick B. Bevins	3 3 3 3 3	15	2 3 3 4 3	15	30
Private Charles A. Chamberlain	3 3 3 3 5	17	3 5 5 5 3	21	38
Private George W. Coates	3 3 5 3 4	18	4 4 3 3 4	18	36
Private Peter Dorsey	3 3 3 3 3	15	4 3 3 5 2	17	32
Private Frederick E. Fairbanks	4 4 3 2 4	17	4 3 4 3 4	18	35
Private Frederick P. Godry	4 5 4 4 5	22	4 3 5 5 4	21	43
Private William Hartmann	3 3 4 5 4	19	4 4 3 4 4	19	38
Private Merritt W. Humason	4 0 4 2 3	13	4 3 3 3 3	16	29
Private Emil C. Kahl	0 3 3 3 3	12	4 3 3 0 4	14	26
Private Henry F. Latham	2 3 4 3 3	15	3 5 4 3 5	20	35
Private Herman Lumpp	3 3 4 4 4	18	4 3 4 3 4	18	36
Private George Lambert	3 3 4 4 3	17	4 5 3 4 4	20	37
Private Charles E. Lee	2 3 4 4 5	18	5 4 5 4 4	22	40
Private Arthur J. Mathews	2 2 3 3 2	12	3 5 3 3 3	17	29
Private Herbert E. Moran	3 4 2 3 2	14	4 0 3 0 4	11	25
Private Matthew Nunney	4 4 3 3 3	17	3 4 3 5 3	18	35
Private Henry W. Pritchard	4 0 3 3 4	14	5 4 4 3 5	21	35
Private William K. Parker	4 4 3 4 4	19	3 5 4 4 5	21	40
Private Clarence H. Rockwell	2 3 3 4 4	16	3 3 3 3 4	16	32
Private James Riley	2 3 3 4 3	15	2 4 4 3 2	15	30
Private John J. Smith	4 3 2 3 4	16	4 3 2 4 3	16	32
Private John C. Schwartz	2 3 3 4 2	14	4 3 4 5 3	19	33
Private James H. Service	4 3 3 2 0	12	3 3 4 4 0	14	26
Private William E. Snowdon	3 4 3 5 5	20	4 0 4 4 4	16	36
Private James A. Turnbull	4 4 4 4 4	20	5 3 4 4 5	21	41
Private Edwin H. Taylor	4 5 4 4 4	21	5 3 5 5 3	21	42
Private Frank E. Vensel	5 4 4 4 3	20	5 5 3 4 4	21	41

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Private John J. Wright	3 3 2 4 4	16	3 4 3 4 3	17	33
Private William B. Wallace	4 4 4 5 4	21	4 4 5 5 5	23	44
Private William E. Wright	3 4 3 3 3	16	2 3 3 0 4	12	28
Total, 52. Average	17.00		17.94		34.94
Company F (Hartford).					
Captain John L. White	2 4 4 4 4	18	3 5 2 2 2	14	32
1st Lieut. Levi H. Hotchkiss	3 4 3 4 5	19	2 3 2 5 3	15	34
2d Lieut. George E. Lee	4 3 5 3 4	19	0 3 4 4 3	14	33
1st Sergeant Wm. H. Robertson	5 5 4 4 5	23	5 5 5 3 5	23	46
Sergeant Erving H. Rood	4 4 5 4 4	21	4 5 2 5 4	20	41
Sergeant Thomas T. Welles	3 3 4 3 4	17	3 5 4 5 3	20	37
Sergeant Alexander Allen	3 4 3 3 0	13	2 5 4 2 3	16	29
Corporal Everett L. Morse	2 2 4 5 3	16	3 0 3 2 4	12	28
Corporal Charles A. Rogers	4 2 3 3 0	12	2 3 4 3 3	15	27
Corporal George B. Newton	5 5 5 4 4	23	4 5 4 5 4	22	45
Corporal Francis B. Wilson	3 2 4 3 3	15	0 5 4 5 0	14	29
Corporal James S. Bryant, Jr.	2 3 4 4 3	16	3 0 4 4 5	16	32
Corp. Robt. H. Douthwaite, Jr.	4 3 5 4 4	20	3 4 4 5 4	20	40
Corporal Alfred W. Green	4 4 5 5 4	22	2 5 5 5 5	22	44
Corporal Charles F. Leigh	3 4 4 3 4	18	2 3 3 5 2	15	33
Musician George S. Carey	4 0 5 4 3	16	0 4 3 0 2	9	25
Private George H. Burt	3 4 4 4 4	19	5 5 4 4 5	23	42
Private Ernst C. Bluehdorn	4 4 5 5 4	22	3 5 3 3 5	18	40
Private George A. Bolles	3 3 4 4 4	18	4 4 0 0 2	10	28
Private William P. Barber	4 5 4 4 4	21	5 5 5 5 5	25	46
Private George L. Best	3 2 3 2 4	14	5 2 5 0 0	12	26
Private Caldwell H. Colt	3 4 2 3 3	15	2 3 3 5 4	17	32
Private Franklin P. Dickinson	2 4 5 0 5	16	4 3 4 2 5	18	34
Private Alexander F. Emmons	3 3 4 4 4	18	4 2 5 2 3	16	34
Private George H. Foster	4 3 4 3 2	16	3 0 0 5 2	10	26
Private Frank G. Foster	4 2 4 3 4	17	0 4 4 4 5	17	34
Private William S. Goodrich	4 4 3 3 3	17	3 4 0 5 0	12	29
Private Curtis P. Gladding	5 3 4 3 2	17	2 4 3 0 2	11	28
Private Louis F. Hueblein	5 5 5 3 4	22	5 5 3 3 4	20	42
Private Henry C. Humphrey	4 3 2 4 2	15	2 0 3 3 4	12	27
Private Chauncy F. Houston	2 4 3 0 4	13	2 5 2 5 2	16	29
Private Burton Hills	4 4 2 0 2	12	2 2 4 5 3	16	28
Private Frank H. Hammond	5 0 2 2 4	13	3 4 3 4 0	14	27
Private Louis B. Hubbard	3 0 5 2 3	13	4 5 2 2 0	13	26
Private Louis O. Jones	3 3 4 4 3	17	2 2 0 2 2	8	25
Private David J. Jordan	5 3 5 4 3	20	4 4 5 5 4	22	42
Private Walter H. Jones	2 5 3 2 3	15	4 0 2 5 4	15	30
Private Elbert S. Kibbe	3 3 2 2 3	13	2 5 0 0 5	12	25
Private William C. Messinger	2 4 5 5 3	19	3 3 4 4 4	18	37
Private Frank D. May	3 3 5 4 3	18	5 2 3 0 2	12	30
Private Herman J. Maercklin	2 4 4 4 3	17	5 3 3 5 5	21	38
Private Edward E. Manderville	3 3 3 3 3	15	4 2 4 5 3	18	33
Private Charles W. Newton	3 3 2 3 4	15	5 2 3 4 2	16	31
Private Frank W. Rogers	3 4 4 4 3	18	4 2 2 3 3	14	32

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Private Frederick H. Robertson	4 2 3 3 3	15	5 2 5 4 4	20	35
Private William M. Smith	4 3 4 2 3	16	5 0 3 4 0	12	28
Private Herbert W. Thompson	3 4 4 3 3	17	0 5 2 3 0	10	27
Private Edwin H. Williams	4 5 4 5 5	23	5 5 5 5 5	25	48
Private Clarence H. Wickham	4 2 2 2 4	14	4 5 5 4 2	20	34
Private Frederick W. Weildon	3 3 0 5 4	15	4 0 2 0 5	11	26
Total, 50. Average	17.06		16.02		33.08
Company G (Manchester).					
Captain Arthur B. Keeney	2 3 5 4 3	17	5 4 5 0 4	18	35
2d Lieut. Thom. H. Montgomery	3 3 3 3 4	16	0 3 3 4 3	13	29
1st Sergeant William R. Dunn	3 4 5 5 4	21	2 4 4 5 0	15	36
Sergeant Patrick Madden	4 3 4 4 3	18	4 3 2 2 3	14	32
Sergeant Walter M. Saunders	4 3 3 4 3	17	3 0 5 3 4	15	32
Corporal Andrew J. Dunn	3 4 5 4 4	20	5 5 3 5 5	23	43
Corporal John M. Shewry	3 3 3 0 3	12	4 2 4 3 5	18	30
Corporal Arthur S. Joyner	2 3 4 4 3	16	2 2 4 2 5	15	31
Corporal William Brink	4 3 4 4 4	19	3 4 4 3 4	18	37
Corporal Gilbert P. Hurd	4 4 3 4 5	20	3 5 4 3 4	19	39
Corporal William J. Fick	3 3 3 4 3	16	2 4 4 4 3	17	33
Musician Charles W. Gleason	4 3 4 4 3	18	3 2 2 2 0	9	27
Private Alfred L. Bidwell	2 3 4 2 4	15	3 5 0 4 0	12	27
Private Robert Cadman	2 2 4 2 4	14	4 5 2 2 0	13	27
Private Harry G. Cheney	4 2 4 3 4	17	3 3 2 4 5	17	34
Private Robert Cheney	4 4 4 4 4	20	5 0 0 2 2	9	29
Private Thomas H. Dunn	3 5 4 4 2	18	0 2 4 3 4	13	31
Private Herman W. Freitag	3 5 3 3 2	16	3 0 2 4 4	13	29
Private Edward D. House	2 5 4 4 5	20	0 0 0 3 5	8	28
Private Dennis Moroney	2 2 4 3 3	14	2 2 5 2 2	13	27
Private William T. Patterson	2 3 4 2 4	15	0 3 4 5 2	14	29
Private William Prutting	2 4 4 4 4	18	3. 2 4 4 2	15	33
Private Ralph B. Watkins	3 4 5 4 3	10	0 0 0 2 4	6	25
Total, 23. Average	17.21		14.22		31.43
Company H (Hartford).					
Captain William M. Clark	4 4 5 5 4	22	5 4 4 4 4	21	43
1st Lieut. George A. Cornell	3 5 3 5 4	20	5 4 5 5 5	24	44
2d Lieut. Henry Simon, Jr.	5 4 5 5 5	24	5 5 5 5 5	25	49
1st Sergeant Everett A. Burnham	4 4 0 4 3	15	5 2 0 5 2	14	29
Sergeant John W. Crane	5 5 5 5 5	25	5 5 5 5 5	25	50
Sergeant Wallace Beach	3 3 2 2 4	14	2 3 3 4 3	15	29
Sergeant George F. Mellein	3 4 3 4 5	19	4 2 4 2 5	17	36
Sergeant Manfred E. Horton	4 4 3 5 5	21	4 3 5 5 5	22	43
Corporal Charles W. Simpson	4 3 2 3 2	14	2 2 3 2 2	11	25
Corporal Horace P. Fox	2 4 4 3 3	16	3 3 4 2 4	16	32
Corporal Lucien P. Smith	3 5 4 4 3	19	3 2 0 0 3	8	27
Corporal Alden J. Allen	5 4 3 4 3	19	5 3 3 5 4	20	39
Corporal George W. Lynch	4 3 3 5 4	19	5 4 3 4 4	20	39
Corporal William H. McLean	4 4 4 4 5	21	2 5 5 5 4	21	42
Corporal William F. Day	4 0 5 3 3	15	2 4 3 2 3	14	29

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Private Alfred C. Baker	4 2 3 4 2	15	5 5 3 4 0	17	32
Private Thomas Brownlee	3 4 3 4 0	14	3 2 3 2 2	12	26
Private Frank V. Chapin	4 5 5 5 5	24	5 5 5 5 5	25	49
Private Joseph P. Corry	3 2 4 5 3	17	4 4 4 2 3	17	34
Private Frank H. Cloyes	3 4 4 3 5	19	2 4 3 2 2	13	32
Private Frederick H. Dean	3 4 2 2 3	14	2 5 2 3 2	14	28
Private Michael J. Dunn	3 3 2 4 4	16	2 0 4 3 3	12	28
Private Charles A. Etherington	5 5 4 3 4	21	5 4 5 5 3	22	43
Private Charles S. Elmer	2 4 4 2 4	16	0 2 3 4 2	11	27
Private Edward J. Gibbons	4 4 0 4 2	14	2 2 5 3 4	16	30
Private James Goldson	3 4 4 4 4	19	2 3 5 4 3	17	36
Private Edward L. Gage	4 4 3 2 0	13	3 4 5 0 3	15	28
Private Henry D. Hinkley	5 4 4 2 3	18	4 3 3 3 3	16	34
Private Henry Hallauer	4 3 4 2 3	16	3 4 4 0 5	16	32
Private LeRoy F. Johnson	4 2 5 4 4	19	0 2 0 3 3	8	27
Private William E. Marshall	3 2 3 5 4	17	2 5 4 3 3	17	34
Private William B. McDonald	4 4 4 4 4	20	4 3 2 2 5	16	36
Private Charles E. Marshall	3 4 3 3 3	16	5 5 2 5 4	21	37
Private Thomas J. Pillion	4 4 3 3 4	18	4 5 3 5 2	19	37
Private Charles H. Patterson	4 3 3 2 5	17	0 4 3 4 5	16	33
Private William J. Pinney	2 2 2 3 4	13	4 2 3 2 5	16	29
Private Frederick G. Pierce	0 3 3 3 3	12	4 2 2 4 3	15	27
Private Horace J. Park	2 3 4 4 4	17	2 4 3 5 2	16	33
Private James W. Reid	4 2 4 4 4	18	0 3 3 4 3	13	31
Private Edward C. Stone	0 3 0 3 0	6	2 5 4 3 5	19	25
Private Edward O. Strong	4 4 2 3 4	17	2 2 0 2 4	10	27
Private Earnest C. Stowell	4 3 4 4 4	19	3 0 4 0 0	7	26
Private Jeremiah W. Snow	4 4 5 4 5	22	5 5 5 4 5	24	46
Private Robert E. Stewart	3 2 3 4 3	15	0 0 5 5 0	10	25
Private Charles R. Stratton	2 4 3 0 3	12	3 2 3 2 3	13	25
Private Albert W. Seymour	3 3 4 2 0	12	2 3 4 3 4	16	28
Private Joseph Vanni	4 4 4 4 4	20	0 5 2 2 2	11	31
Private Albert D. Vinton	4 4 3 4 3	18	4 2 4 5 3	18	36
Private John C. Webster	2 3 3 3 2	13	5 5 0 5 2	17	30
Private Henry Work	4 4 4 3 4	19	3 3 4 3 5	18	37
Private John F. Fox	4 4 5 3 3	19	3 0 2 3 3	11	30
Private William J. Fox	4 3 4 3 2	16	0 4 0 3 2	9	25
Total, 52. Average	17.19		16.07		33.26
Company I (Windsor Locks).					
1st Lieut. William Bake	3 4 3 3 3	16	2 3 0 0 5	10	26
Sergeant Addison B. Stockwell	2 2 3 4 4	15	3 3 4 3 5	18	33
Sergeant John L. Hutchins	0 5 3 3 3	14	2 5 3 4 0	14	28
Corporal Thomas F. Sexton	3 4 3 2 3	15	5 3 0 0 5	13	28
Private John Murphy	0 3 2 4 4	13	2 2 4 2 3	13	26
Private Thomas Smith	3 5 3 2 3	16	3 0 2 2 2	9	25
Total, 6. Average	14.83		12.83		27.66

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Company K (Hartford).					
Captain Thomas M. Smith	5 4 3 3 4	19	0 5 3 3 3	14	33
1st Lieut. Charles E. Thompson	4 5 4 4 5	22	5 5 5 5 4	24	46
2nd Lieut. Samuel O. Prentice	5 3 5 4 4	21	2 5 4 3 2	16	37
1st Sergeant George D. Bates	4 0 4 2 5	15	5 4 4 0 2	15	30
Sergeant James H. Jarman	3 4 4 4 4	19	2 4 5 5 0	16	35
Sergeant Joseph H. Towne, Jr.	4 4 5 3 2	18	0 4 3 0 0	7	25
Sergeant Edward R. Parmelee	4 3 4 3 4	18	5 4 3 3 4	19	37
Sergeant Charles H. Barber	4 3 3 3 2	15	3 2 4 0 3	12	27
Corporal DeWitt P. Preston	4 5 4 4 4	21	5 5 5 5 4	24	45
Corporal Charles E. Chase	0 4 0 4 4	12	4 3 3 2 4	16	28
Corporal Frank D. Rood	3 3 4 3 3	16	2 4 3 2 2	13	29
Corporal Howard W. Cook	4 3 3 3 3	16	2 4 4 0 0	10	26
Corporal Solon P. Davis	4 3 4 2 2	15	0 4 2 0 4	10	25
Corporal Charles H. Slocum	4 2 4 0 2	12	2 3 3 4 3	15	27
Corporal William S. Hatch	4 4 4 2 3	17	4 5 0 2 4	15	32
Private William L. B. Barker	4 4 2 5 4	19	0 4 5 4 3	16	35
Private Joseph G. Birch	2 3 2 4 3	14	4 4 3 0 4	15	29
Private Charles H. Bell	3 3 4 4 4	18	5 0 5 4 0	14	32
Private John F. Burpee	3 3 3 3 3	15	2 2 4 2 5	15	30
Private Charles L. Burdett	5 0 3 3 3	14	5 3 0 4 5	17	31
Private Francis G. Bonnel	4 2 0 4 4	14	4 4 3 4 2	17	31
Private Henry T. Bronson	3 3 2 2 5	15	2 4 3 2 0	11	26
Private Silas H. Cornwell	4 0 5 5 3	17	3 2 4 4 2	15	32
Private John D. Candee	4 3 4 4 4	19	5 3 2 3 2	15	34
Private James R. Chapman	4 4 2 4 3	17	4 0 0 4 3	11	28
Private Frank B. Case	3 2 3 4 3	15	4 3 5 4 4	20	35
Private Willis B. Case	4 3 4 4 4	19	2 2 4 4 0	12	31
Private Edward B. Dix	3 4 4 3 3	17	3 3 3 2 4	15	32
Private Edward H. Ensign	2 2 3 3 2	12	2 2 5 2 4	15	27
Private Thomas W. Gleason	4 5 4 4 3	20	4 5 4 3 4	20	40
Private Julius F. Gratz	2 4 2 5 0	13	5 0 3 2 5	15	28
Private J. Coolidge Hills	4 3 4 4 4	19	5 2 0 0 2	9	28
Private Howard H. Keep	2 5 3 0 4	14	4 4 2 3 2	15	29
Private Thomas A. Kimberly	4 5 4 4 4	21	3 2 3 3 5	16	37
Private Arthur M. Lane	2 3 2 3 4	14	2 3 3 5 3	16	30
Private Daniel W. Mack	3 5 4 4 4	20	2 4 5 4 3	18	38
Private Harris Parker	4 3 0 3 3	13	3 3 2 3 2	13	26
Private Melvin D. Pratt	2 4 3 3 4	16	3 2 3 3 2	13	29
Private Elmer C. Quiggle	4 5 3 4 3	19	3 3 4 4 3	17	36
Private Charles A. Rich	4 3 2 3 0	12	5 5 0 4 3	17	29
Private Edward F. Rogers	4 5 4 0 0	13	5 3 3 0 4	15	28
Private Henry H. Saunders	3 4 5 3 4	19	3 5 4 4 2	18	37
Private Charles L. Sisson	2 3 2 3 4	14	2 2 5 2 4	15	29
Private Jesse G. Smith	3 2 2 0 5	12	4 3 2 4 0	13	25
Private George F. Scarborough	4 5 4 4 4	21	5 2 4 5 4	20	41
Private Emery J. San Sousi	2 4 3 0 4	13	5 4 0 5 2	16	29
Private Wilbur H. Squire	4 3 0 2 3	12	4 2 5 2 0	13	25
Private John W. Shepard	4 4 0 2 4	14	5 2 3 4 2	16	30
Private Samuel G. Tracy	4 4 4 5 5	22	5 4 4 5 5	23	45

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Private Robert O. Tyler	2 2 3 4 3	14	2 2 0 5 5	14	28
Private William J. Tuller	4 4 3 3 4	18	3 3 5 4 3	18	36
Private Edwin S. Tyler, Jr	4 4 3 4 5	20	4 0 3 2 0	9	29
Private William A. Willard	4 4 5 4 4	21	2 3 5 4 3	17	38
Private Edson A. Welsh	3 3 4 3 2	15	3 5 3 3 4	18	33
Private Henry R. Williams	4 4 3 3 4	18	0 2 2 4 3	·11	29
Private Arthur P. Young	3 4 3 4 4	18	2 3 2 2 4	13	31
Private Chester D. Fisk	2 3 0 4 4	13	4 4 3 2 5	18	31
Total, 57. Average	16.44		15.26		131.7

RECAPITULATION.

FIRST REGIMENT.	Number of Marksmen.	Average Scores.		Total.
		200 Yards.	500 Yards.	
Field and Staff	11	19.91	19.72	39.63
Company A	23	15.35	14.34	29.69
Company B	27	14.63	13.66	28.29
Company C	10	16.80	12.00	28,80
Company D	5	18.40	19.20	37.60
Company E	52	17.00	17.94	34.94
Company F	50	17.06	16.02	33.08
Company G	23	17.21	14.22	31.43
Company H	52	17.19	16.07	33.26
Company I	6	14.83	12.83	27.66
Company K	57	16.44	15.26	31.70
Total	316	16.80	15.57	32.37
Per cent. of possible score				64.74

Classification of the First Regiment, C. N. G., in Target Practice, 1880, with Figure of Merit of Each Company.

	Fifth Class. All not practicing in 1880.	Fourth Class. Failing at 100 yards.	Third Class. Qualifying at 100 yards.	Second Class. Qualifying at 150 and 200 yards.	First Class. Qualifying at 300 and 400 yards.	Marksmen. Qualifying at 200 and 500 yards.	Membership, October 31, 1880.	Figure of Merit, 1880.	Marksmen, 1879.	Gain over 1879.	Loss over 1879.	Figure of Merit, 1879.
Field and Staff	3	0	1	0	1	11	16	73.75	11	----	----	73.34
Company A	9	6	8	9	11	23	66	51.82	10	13	----	25.92
" B	1	0	17	10	5	27	60	60.66	14	13	----	35.56
" C	21	1	10	6	9	10	57	33.77	3	7	----	16.02
" D	20	0	0	12	32	5	69	40.29	24	----	19	44.76
" E	2	1	1	2	5	52	63	88.65	68	----	16	86.09
" F	0	4	2	4	6	50	66	83.94	57	----	7	80.00
" G	12	6	13	3	4	23	61	47.87	13	10	----	29.63
" H	1	1	0	2	9	52	65	89.31	59	----	7	84.26
" I	3	15	21	6	5	6	56	28.12	2	4	----	18.63
" K	3	1	7	6	4	57	78	80.32	42	15	----	61.15
Totals	75	35	80	60	91	316	657		303	62	49	

Figure of Merit of First Regiment, C. N. G., 1880.

Marksmen	316	×	100	=	31.600
First-class shots	91	×	60	=	5.460
Second-class shots	60	×	30	=	1.800
Third-class shots	80	×	20	=	1.600
Fourth-class shots	35	×	5	=	.175
Fifth Class, (absentees)	75	×	0	=	.000
	657				40.635
Band	19				
Total	676				

Figure of Merit for 1880		61.85
Figure of Merit for 1879		51.04
Figure of Merit for 1878		28.27
Gain over 1879	10.81	

Aggregate membership, October 31, 1880, exclusive of Band	657
Number of Marksmen, 1880	316

Percentage, 1880		48.09
Percentage, 1879		41.39
Percentage, 1878		16.70
Gain over 1879	6.70	

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total	Aggregate.
SECOND REGIMENT:					
Field and Staff.					
Colonel Chas. P. Graham	3 3 5 3 4	18	5 4 0 3 2	14	32
Capt. and Adjt. F. E. Camp	2 3 3 4 4	16	2 0 2 3 4	11	27
Chaplain S. D. McConnell	2 4 4 4 4	18	2 4 3 4 3	16	34
Com. Sergeant W. U. Pearne	4 3 2 3 2	14	4 4 3 2 4	17	31
Major and Surg. E. L. Bissell	4 4 5 4 4	21	4 4 3 4 5	20	41
Capt. and I. T. P. Andrew Allen	4 4 4 4 4	20	5 5 5 4 4	23	43
Total, 6.					
Company A.					
Captain F. A. Spencer	4 4 4 3 4	19	4 5 4 4 3	20	39
1st Lieut. F. R. White	4 5 5 4 4	22	4 3 5 4 5	21	43
Sergeant C. S. Crampton	4 4 4 4 4	20	5 5 4 5 5	24	44
Sergeant F. H. Miller	3 4 4 3 3	17	3 5 4 5 2	19	36
Sergeant C. E. Hall	3 4 3 4 4	18	0 4 3 5 4	16	34
Sergeant F. R. Woolworth	5 3 3 3 4	18	2 5 5 4 5	21	39
Private C. H. Blake	4 4 3 4 4	19	4 5 3 2 3	17	36
Private G. R. Crampton	4 3 3 2 3	15	0 5 5 3 3	16	31
Private W. R. Harrison	4 4 4 5 5	22	3 4 2 3 5	17	38
Private C. H. Nichols	5 4 3 4 3	19	2 4 3 5 5	19	39
Private J. M. Peffers	2 5 5 3 3	18	2 2 3 3 5	15	33
Private T. L. Sanford	2 2 4 4 2	14	2 2 0 5 5	14	28
Private T. M. Shanahan	3 0 3 4 4	14	4 3 2 5 2	16	30
Private C. S. Smith, Jr.	3 4 4 4 4	19	2 3 4 4 5	20	39
Private G. B. Steele	3 4 4 4 4	19	4 0 4 2 5	15	34
Private W. D. Upson	4 4 4 3 4	19	3 5 3 5 0	16	35
Private W. A. Warner	4 3 4 4 3	18	3 4 4 5 5	21	39
Total, 17.					
Company C.					
Captain Maurice F. Brennan	3 4 4 4 5	20	3 4 4 4 5	20	40
2d Lieut. Edward Lynn	3 2 4 4 4	17	4 4 4 4 3	19	36
Sergeant John F. Shannahan	3 4 3 3 4	17	2 4 0 2 4	12	29
Sergeant John Garrity	4 5 2 4 4	19	2 3 3 4 3	15	34
Sergeant Francis J. Duffy	0 4 2 2 3	11	0 3 5 2 4	14	25
Corporal Michael F. Keegan	3 3 3 4 4	17	0 4 3 4 4	15	32
Corporal Maurice O'Connor	4 3 5 5 2	19	3 2 4 5 4	18	37
Corporal James J. Kennedy	4 3 3 4 5	19	3 0 3 3 3	12	31
Corporal Michael Creed	4 4 2 3 5	18	0 2 2 2 4	10	28
Musician Michael O'Connor	3 0 3 4 3	13	5 2 0 3 4	14	27
Private Daniel F. Kelly	4 2 4 4 4	18	0 0 2 2 3	7	25
Total, 11.					
Company E.					
Captain H. R. Loomis	3 3 3 4 3	16	0 2 3 4 4	13	29
1st Lieut. S. A. Downs	5 3 3 4 4	19	3 2 3 2 2	12	31
Sergeant L. B. Fairchild	3 4 3 3 3	16	2 0 4 3 5	14	30
Sergeant J. Coombs	3 4 5 3 3	18	2 2 2 0 3	9	27

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Sergeant R. M. Walker	4 4 4 3 3	18	5 4 4 5 3	21	39
Corporal Theo. Sucher	4 3 2 0 4	13	2 4 2 4 0	12	25
Corporal J. E. Parker	3 4 3 3 2	15	3 2 4 3 4	16	31
Corporal A. H. Bennett	3 4 4 3 3	17	3 3 4 3 2	15	32
Private G. R. Nichols	4 4 4 4 5	21	4 4 5 5 3	21	42
Private J. Tinkey	4 5 4 5 5	23	5 5 5 5 5	25	48
Private E. Whitlock	4 4 4 4 5	21	5 5 3 2 4	19	40
Private G. Marshall	4 4 4 4 3	19	3 3 3 4 5	18	37
Private C. Vaille	2 4 4 3 0	13	5 2 5 3 0	15	28
Private A. Hohenstein	3 4 3 3 4	17	3 5 3 4 4	19	36
Private D. Tolles	0 4 4 2 0	10	5 4 4 3 4	19	29
Private Wm. Rhodes	3 0 4 3 4	14	3 2 3 5 0	13	27
Private W. H. Braun	3 4 3 5 4	19	3 5 4 3 4	19	38
Private F. W. Allen	4 4 0 2 4	14	5 4 3 4 4	20	34
Private E. Brinsmade	0 2 3 4 4	13	2 2 3 5 5	17	30
Private E. Hyatt	2 4 3 3 4	16	4 2 4 4 0	14	30
Private H. Hamilton	2 2 3 4 2	13	2 2 4 2 5	15	28
Total, 21.					
Company F.					
Captain George S. Arnold	3 4 0 3 3	13	4 3 3 0 2	12	25
1st Lieut. A. M. Howarth	4 4 3 3 4	18	4 3 3 2 3	15	33
2d Lieut. F. A. Bowman	4 4 4 4 3	19	3 2 2 3 5	15	34
Sergeant J. T. Clark	4 3 2 3 2	14	3 5 3 3 4	18	32
Sergeant E. S. Osborn	2 3 3 4 4	16	2 3 3 4 4	16	32
Corporal G. H. Lowe	4 4 4 4 3	19	4 3 4 5 5	21	40
Corporal W. H. Sears	4 3 4 3 4	18	5 3 4 4 2	18	36
Corporal W. H. Bradley	3 3 3 3 4	16	2 3 3 4 3	15	31
Corporal W. H. Stratton	3 4 4 3 3	17	4 4 4 4 5	20	37
Private F. C. King	2 2 3 3 3	13	2 3 4 4 5	18	31
Private W. M. Frisbie	3 4 3 0 3	13	4 0 2 2 4	12	25
Private W. H. Blakeslee	3 3 3 2 3	14	2 3 5 4 3	17	31
Private F. H. Ley	0 3 3 3 4	13	3 3 3 0 3	12	25
Private F. E. Austin	2 2 3 3 4	14	3 4 0 4 2	13	27
Total, 14.					
Company H.					
Captain H. J. Bacon	4 4 3 4 5	20	5 2 4 2 3	16	36
1st Lieut. F. E. Nourse	0 2 2 4 0	8	4 4 4 3 2	17	25
2d Lieut. J. T. Elliott	3 4 3 3 3	16	3 2 5 5 5	20	36
Sergeant D. R. Craig	4 4 2 4 3	17	2 5 4 3 3	17	34
Sergeant E. A. Shaler	3 0 5 2 5	15	0 3 2 5 2	12	27
Sergeant G. E. Schofield	4 5 4 4 4	21	2 3 3 2 2	12	33
Corporal W. A. Holmes	4 3 4 4 3	18	0 0 5 5 4	14	32
Corporal J. J. Kincaid	2 4 3 3 4	16	3 2 0 2 4	11	27
Corporal C. F. Pratt	4 3 3 4 4	18	5 3 4 3 3	18	36
Corporal E. A. Summers	4 3 4 4 3	18	2 5 3 3 5	18	36
Corporal B. D. Putnam	2 4 4 4 0	14	2 5 3 5 5	20	34
Corporal Wm. M. Cheeney	4 2 4 3 3	16	4 2 4 4 2	16	32
Private J. W. Bement	4 3 2 3 4	16	2 0 3 4 2	11	27
Private C. F. Buck	3 2 2 4 4	15	2 0 4 3 3	12	27

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Private H. Emmett	4 4 4 2 4	18	5 0 3 5 3	16	34
Private F. B. Hale	3 3 2 3 4	15	2 3 3 0 2	10	25
Private G. W. Hammers	3 2 4 3 4	16	3 3 2 4 4	16	32
Private R. L. Berry	4 2 3 2 4	15	5 3 5 5 2	20	35
Private Elton L. Rich	2 2 3 4 3	14	3 3 4 3 2	15	29
Total, 19.					
Company I.					
Captain H. B. Wood	3 4 5 3 3	18	3 3 4 5 4	19	37
1st Lieut. John N. Lane	4 5 4 4 5	22	4 5 4 4 5	22	44
2d Lieut. William Collins	4 4 3 4 3	18	5 5 2 4 4	20	38
Sergeant Edward Tilcston	3 5 3 3 4	18	2 4 2 3 2	13	31
Sergeant Charles Sanford	3 4 4 3 0	14	2 4 5 4 4	19	33
Sergeant S. A. Bronson	2 3 2 4 4	15	4 3 2 0 4	13	28
Corporal J. C. Booth	2 3 3 4 4	16	3 4 3 5 2	17	33
Corporal H. H. Benton	4 3 4 3 5	19	0 2 4 5 4	15	34
Corporal Walter Fidler	3 3 4 4 2	16	0 0 2 5 3	10	26
Corporal Louis Rosalius	2 4 3 5 3	18	2 2 0 5 3	12	30
Musician Harry Vibert	2 3 2 4 3	14	2 0 2 2 5	11	25
Musician Charles Goodrich	5 3 4 4 3	19	2 2 5 5 3	17	36
Private C. A. Burgess	4 3 4 4 5	20	4 4 2 4 3	17	37
Private Charles Cruise	4 2 4 4 4	18	2 2 2 4 4	14	32
Private Thomas Broadbent	3 4 3 2 3	15	4 2 0 4 3	13	28
Private Eugene Beckley	2 2 4 3 0	11	2 4 2 2 4	14	25
Private Oscar Bradley	4 4 4 0 0	12	0 2 4 4 5	15	27
Private C. J. Hubbard	3 4 5 3 4	19	5 4 3 3 2	17	36
Private Walter Jones	4 3 0 3 4	14	4 3 2 0 4	13	27
Private Edward Keller	5 4 2 0 2	13	2 4 2 4 0	12	25
Private James Mackey	3 4 3 3 4	17	0 3 3 4 4	14	31
Private Edward Parker	2 3 2 3 3	13	2 0 4 2 4	12	25
Private Wilbert Painter	4 3 4 5 5	21	0 0 0 3 5	8	29
Private J. Stillman	3 2 4 3 3	15	4 0 5 0 5	14	29
Private C. E. Stokes	4 2 4 5 3	18	0 2 5 3 0	10	28
Private George Simpson	4 3 2 2 3	14	5 0 3 5 3	16	30
Private A. D. Sanford	2 3 3 3 3	14	3 3 2 4 2	14	28
Private Henry Thomas	3 3 0 4 0	10	5 2 5 2 4	18	28
Private F. J. Wallace	4 5 3 4 3	19	3 0 2 3 5	13	32
Private P. B. Wilkinson	4 5 3 3 5	20	5 3 5 3 3	19	39
Total, 30.					
Company K.					
Captain William N. Mix	3 4 4 4 4	19	0 0 3 3 2	8	27
1st Lieut. G. G. LaBarnes	3 4 4 4 4	19	3 2 5 5 5	20	39
1st Sergeant H. Atkinson	4 4 4 4 4	20	3 4 0 4 4	15	35
Sergeant F. L. Waples	4 3 3 5 0	15	5 2 2 2 2	13	28
Sergeant Z. P. Beach	3 0 4 5 2	14	5 5 3 5 3	21	35
Sergeant George Dickinson	3 4 5 4 3	19	3 3 0 2 3	11	30
Sergeant J. A. Wooding	2 3 3 2 4	14	3 5 4 0 5	17	31
Corporal E. E. Talmage	2 3 5 0 2	13	3 5 5 0 0	13	26
Corporal W. H. Talcott	5 4 4 5 3	21	2 0 2 4 4	12	33

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Corporal Henry Jones	3 3 4 4 3	17	5 3 5 3 4	20	37
Corporal J. G. Phelan	2 3 3 4 3	15	2 0 5 5 5	17	32
Corporal A. E. Hobson	3 4 4 4 3	18	4 4 4 5 4	21	39
Private Percy Atkinson	3 3 3 4 3	16	2 4 2 4 5	17	33
Private C. W. Charter	4 3 2 4 2	15	2 5 4 0 2	13	28
Private H. E. Woodward	4 4 3 4 4	19	4 2 2 0 2	10	29
Private M. E. Pierce	4 4 4 3 5	20	0 0 4 0 2	6	26
Private J. A. DeVine	3 3 4 3 4	17	0 2 0 4 2	8	25
Private J. H. Delahanty	3 0 3 2 3	11	3 4 4 4 0	15	26
Private H. P. Eaton	0 3 2 4 4	13	4 3 0 4 2	13	26
Private K. Hauenstein	4 5 4 3 3	19	3 4 0 0 2	9	28
Private W. T. Williams	4 0 3 3 2	12	2 3 3 3 2	13	25
Private J. S. Avery	2 5 4 5 3	19	4 4 5 3 4	20	39
Private J. M. Cannon	4 4 3 0 4	15	3 3 3 2 4	15	30
Private S. J. Stowe	2 2 4 3 4	15	2 2 0 4 3	11	26
Private Charles E. Blunt	4 4 0 4 3	15	3 4 3 3 3	16	31
Private W. J. Leavenworth	3 3 3 0 2	11	3 3 2 3 5	16	27
Private W. J. Pearce	4 4 3 4 3	18	5 4 3 3 5	20	38
Private Robert Steele	3 3 3 3 3	15	2 4 3 2 3	14	29
Private J. E. Marriatt	5 4 4 4 3	20	2 0 0 3 3	8	28
Private Lewis Pearce	3 3 4 4 2	16	2 4 2 0 4	12	28
Total, 30.					
Total Marksmen, 148.					
THIRD REGIMENT:					
Staff.					
Capt. and I. T. P., A. W. Sholes	4 5 5 4 5	23	2 3 4 5 5	19	42
Company B.					
Captain Michael Twomey	3 4 3 3 4	17	2 5 0 0 3	10	27
2d Lieut. Daniel Keleher	4 3 4 4 4	19	0 5 2 0 0	7	26
Corporal Arthur Leiper	3 3 3 3 3	15	3 4 4 4 4	19	34
Corporal Con. Bransfield	4 2 4 4 3	17	2 4 2 2 3	13	30
Total, 4.					
Company D.					
1st Lieut. Fred. St. Clair	3 4 3 4 3	17	4 0 0 4 4	12	29
Sergeant Joseph Burrows	4 4 4 4 4	20	2 4 2 4 3	15	35
Total, 2.					
Company I.					
2d Lieut. Wm. A. Mercer	2 3 4 4 3	16	5 3 5 4 4	21	37
Sergeant A. Bishop	3 4 5 3 5	20	4 4 4 4 5	21	41
Corporal Charles Miner	3 3 5 5 3	19	0 0 0 3 3	6	25
Corporal Charles Holt	3 2 3 0 3	11	5 5 5 5 5	25	36
Private R. Neff	5 4 5 4 4	22	0 2 4 3 0	9	31
Total, 5.					
Total Marksmen, 12.					

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
FOURTH REGIMENT:					
Staff.					
Major George F. Lewis	4 5 5 4 5	23	3 5 4 5 5	22	45
Sergt.-Major Geo. E. Derrick	4 4 3 4 4	19	3 2 4 5 4	18	37
Com. Sergt. Chas. A. Blakeman	4 3 5 4 5	21	3 5 5 4 5	22	43
Q. M. Sergeant Harry Nichols	4 5 4 5 5	23	5 4 4 5 5	23	46
Capt. & I. T. P., S. C. Kingman	5 5 4 4 3	21	4 3 4 5 5	21	42
Total, 5.					
Company B.					
1st Lieut. Francis A. King	3 3 4 3 4	17	2 2 4 3 4	15	32
2d Lieut. W. T. Van Yorx	5 4 4 4 4	21	3 4 5 5 4	21	42
Private George Stirn	4 5 4 4 4	21	2 5 5 5 4	21	42
Private Harlan P. Rugg	4 5 5 4 4	22	5 3 4 4 2	19	41
Sergeant Charles E. Beers	2 4 4 4 5	19	4 4 4 5 4	21	40
Corporal Charles Gibson	3 4 4 4 4	19	4 5 2 4 3	18	37
Private Garrie P. Sanger	5 3 3 3 4	18	4 3 2 5 2	16	34
Private John A. Ackler	3 3 5 3 4	18	3 3 2 3 4	15	33
Captain George W. Cornell	2 3 2 2 4	13	5 3 4 4 3	19	32
Private Dwight Cleveland	4 2 3 3 4	16	3 3 4 2 4	16	32
Corporal George W. King	3 4 0 4 4	15	2 4 2 3 5	16	31
Private Frederick Weed	3 3 3 3 3	15	5 3 5 0 2	15	30
Private George H. Bright	4 2 3 3 2	14	2 3 3 4 3	15	29
Private James H. Hildreth	2 2 3 3 5	15	2 3 3 2 4	14	29
Private Arthur W. Burritt	4 4 2 4 3	17	3 4 2 0 3	12	29
Corporal William H. Stevens	5 4 2 4 4	19	3 3 0 0 4	10	29
Corporal Matthias Ruperts	3 2 4 2 2	13	3 3 2 3 4	15	28
Corporal Michael W. Burke	3 3 4 3 3	16	2 3 0 4 3	11	28
Sergeant Henry W. Zehner	2 3 0 3 3	11	5 0 3 4 3	15	26
Private Charles A. Judson	0 4 2 4 4	14	2 0 2 4 4	12	26
Total, 20.					
Company C.					
Captain William W. Studwell	4 5 4 4 4	21	0 2 3 5 4	14	35
Lieut. A. M. Horton	2 3 4 5 4	18	0 3 2 4 3	12	30
Corporal James Wilson	3 4 3 4 4	18	0 4 2 3 2	11	29
Lieut. C. E. Palmer	3 3 4 4 4	18	0 2 2 5 0	9	27
Total, 4.					
Company D.					
Private F. Klein	4 3 4 5 4	20	3 3 4 5 4	19	39
Total, 1.					
Company E.					
Captain Edward N. Goodwin	3 4 3 5 4	19	0 0 4 4 3	11	30
Corporal Patrick Martin	2 4 4 3 4	17	2 4 3 2 2	13	30
Corporal James Cunningham	4 4 2 4 2	16	2 3 0 3 0	9	25
Private Jerome Williams	3 3 4 4 4	18	4 2 3 4 3	16	34
Sergeant Thomas Cleary	3 4 4 4 2	17	2 2 3 4 0	11	28

MARKSMEN QUALIFYING IN 1880, AND THEIR SCORES—CONTINUED.

Names.	200 Yards.	Total.	500 Yards.	Total.	Aggregate.
Sergeant John Finn	3 4 4 4 3	18	0 0 3 4 2	9	27
Private Thomas Hyde	3 3 0 4 2	12	4 2 4 2 2	14	26
Corporal James Carter	4 0 3 4 3	14	3 0 3 3 3	12	26
Sergeant John P. Glennon	0 4 4 4 3	15	0 3 3 3 2	11	26
Private Patrick Clancy	4 4 3 4 2	17	0 3 3 3 0	9	26
Total, 10.					
Company F.					
Sergeant F. B. Raymond	3 3 2 3 3	14	2 3 4 5 5	19	33
Private S. H. Sellick	2 4 3 3 3	15	2 3 4 2 4	15	30
Total, 2.					
Company I.					
Corporal Edmund B. Peck	4 4 5 4 4	21	4 3 5 4 4	20	41
Corporal A. R. Deming	4 4 4 4 5	20	4 2 3 5 5	19	40
Total, 2.					
Company K.					
Sergeant B. H. Weller	4 5 5 4 5	23	5 5 5 4 5	23	47
Sergeant James S. Hubbell	3 4 5 4 4	20	5 5 5 5 5	25	45
Corporal Fred. P. Thompson	5 4 4 4 5	22	4 4 5 5 4	22	44
Private Albert M. Porter	3 4 4 5 4	20	5 3 5 5 5	23	43
Private Henry A. Porter	4 5 5 4 4	22	5 3 4 3 5	20	42
Private Irving W. Judson	3 4 4 5 4	20	5 5 3 5 3	21	41
1st Lieut. Charles Wilcoxson	4 3 4 3 3	17	4 5 5 5 3	22	39
Private John J. Kugler	3 5 3 4 3	18	2 5 5 5 3	20	38
Private T. B. Budington	3 4 3 4 2	16	5 4 3 3 3	20	36
Sergeant Eugene Moorehouse	4 3 4 4 4	19	5 2 3 4 3	17	36
Private Stiles Judson, jr.	3 3 3 5 4	18	5 2 3 4 3	17	35
Private M. C. Cook	3 4 3 4 2	16	3 3 4 3 4	17	33
Captain Henry M. Blakeslee	4 3 2 3 3	15	4 3 4 2 3	16	31
Private J. R. Stagg	3 2 5 3 2	15	3 2 3 4 4	16	31
Corporal Eliezur Beardsley	4 3 4 2 5	18	3 3 0 3 4	13	31
Corporal F. S. Gorham	3 3 4 3 5	18	0 3 2 4 4	13	31
Private W. H. Fryer	4 3 5 3 3	18	5 5 0 0 2	12	30
Private Arthur Judson	3 4 3 4 2	16	4 0 2 3 4	13	29
Private E. F. Hall	4 3 3 4 5	19	2 3 2 3 0	10	29
Corporal William A. Stagg	3 4 3 3 2	15	3 2 2 2 3	12	27
Private W. B. Bristol	5 3 3 4 2	17	2 0 0 2 5	9	26
Total, 21.					
Total Marksmen, 65.					
Fifth Battalion.					
Major W. H. Layne, jr.	4 3 3 4 4	18	2 3 3 3 0	12	30

Companies having most Marksmen in each Regiment.

Regt.		Marksmen.
First	Co. K, Hartford	57
Second	Co. I, Meriden	30
Second	Co. K, Wallingford	30
Third	Co. I, New London	5
Fourth	Co. K, Stratford	21

Best Individual Scores in each Regiment.

Co.	Regt.	Names.	200 Yards.	Total.	500 Yards.	Total.	G. T.
Co. E	1st Regt.	Lieut. J. Lester Osgood	5 5 5 5 5	25	5 5 5 5 5	25	50
Co. H	1st "	Sergt. John W. Crane	5 5 5 5 5	25	5 5 5 5 5	25	50
Co. E	2d "	Priv. E. Tinkey	4 5 4 5 5	23	5 5 5 5 5	25	48
Staff	3d "	Capt. A. W. Sholes, I.T.P.	4 5 5 4 5	23	2 3 4 5 5	19	42
Co. K	4th "	Sergt. Bruce Weller	4 5 5 4 5	23	5 5 5 4 5	24	47

Companies that have Carried out the System of Classification.

Regt.	Number.	Companies.	
First	10	A, B, C, D, E, F, G, H, I, K.	
Second	6	A, E, F, H, I, K,	Loss 3 Companies.
Third	None	None,	" 5 "
Fourth	2	B, K,	" 5 "
Total	18		Loss 13 Companies.

Companies not Carrying out the System.

Regt.	Number.	Companies.
First	0	
Second	4	B, C, D, G.
Third	10	A, B, C, D, E, F, G, H, I, K.
Fourth	8	A, C, D, E, F, G, H, I.

Marksmen for 1880.

Regiments.	Membership Oct. 31, 1880.	No. Marksmen.	Percentage.	Gain or Loss.
Brig. Staff	8	4	50.00	.25 G
First	657	316	48.00	6.70 G
Second	616	148	24.00	1.19 L
Third	641	12	02.00	.91 L
Fourth	641	65	10 00	2.64 L
Fifth Battalion	258	1	00.39	.39
Grand Total	2,821	546	22.40	00.27

REPORT OF EXAMINING BOARD.

BRIGADE ENCAMPMENT,

NIANTIC, August 27, 1880.

Brigadier-General EDWARD HARLAND,

Adjutant-General.

GENERAL,—In compliance with General Orders, No. 7, dated August 7, 1880, the undersigned convened at this place on Wednesday, August 25, for the purpose of examining the several officers of the Connecticut National Guard who had been ordered to appear before us.

Each officer was examined in a thorough course of such tactics as are required for the proper performance of the duties of his position. As the result, we pronounce the following-named to be well qualified, having passed the examination satisfactorily:

FIRST REGIMENT.

Captain JOSEPH REED.
Captain PATRICK J. MORAN.
Captain ARTHUR B. KEENEY.
Captain THOMAS J. RIGNEY.
First Lieutenant THOMAS F. FLANIGAN.
First Lieutenant ARTHUR J. WETHERELL.
Second Lieutenant PATRICK H. SMITH.
Second Lieutenant THOMAS H. MONTGOMERY.
Second Lieutenant FRANK KARBER.

SECOND REGIMENT.

Captain GEORGE S. ARNOLD.
Captain LUZERNE I. THOMAS.
Captain HENRY J. BACON.
First Lieutenant GEORGE LAWRENCE.
First Lieutenant FRANK E. NOURSE.
First Lieutenant FRANK R. WHITE.
Second Lieutenant RICHARD W. WAITE.

Second Lieutenant William Collins.
Second Lieutenant James Horigan.
Second Lieutenant Frank A. Bowman.
Second Lieutenant Joseph T. Elliott.
Second Lieutenant John B. Doherty.

THIRD REGIMENT.

Captain Daniel A. O'Neill.
Captain Seth C. Spaulding,
First Lieutenant James O'Sullivan.
First Lieutenant Henry J. Hill.
First Lieutenant Danforth Clements.
First Lieutenant William M. Snow.
Second Lieutenant Daniel Keleher.
Second Lieutenant William C. Jones.
Second Lieutenant Arthur L. Story.
Second Lieutenant Chas. W. Harrington.

FOURTH REGIMENT.

Captain Henry M. Blakeslee.
Captain John H. Slocum.
Captain Addison A. Betts.
Captain George W. Cornell.
First Lieutenant Samuel Cone.
First Lieutenant Edward Finn.
First Lieutenant Ferdinand B. Smith.
First Lieutenant Edward F. Jennings.
First Lieutenant Francis A. King.
Second Lieutenant Franklin P. Perkins.
Second Lieutenant Cornelius Delury.
Second Lieutenant William R. Phillips.
Second Lieutenant Alvan A. Hauschildt.
Second Lieutenant Wilfred T. Van Yorx.

FIFTH BATTALION.

Major William H. Layne, Jr.
Captain and Adjutant Charles S. Tatten.
Captain John W. Williams.
First Lieutenant Robert Butler.
First Lieutenant Luther Harris.
Second Lieutenant Wm. H. Latimer.

The following-named officers did not appear before the Board for examination, viz:

First Lieutenant THOMAS WHITE, Second Regiment.
Second Lieutenant FRANK E. THOMPSON, Third Regiment.
Second Lieutenant GEORGE L. DICKENS, Fourth Regiment.

The following-named officers failed to pass a satisfactory examination, viz:

First Lieutenant JOHN ABBEY, First Regiment.
First Lieutenant HIRAM FRANKLIN, Third Regiment.
Second Lieutenant JOSEPH H. MAYNARD, Third Regiment.
Second Lieutenant ANDREW MARSHALL, Fifth Battalion.

The great majority of the officers examined gave evidence of careful study and close attention on their part to the Book of Tactics. This was more especially evident in the examination of the officers of the Second and Fourth Regiments and Fifth Battalion.

We believe that officers ought at all company drills, in the armories and company halls, to use the Book of Tactics, and by it to verify every movement, and to give every instruction in the exact language of the book. This course will effectually correct the too prevalent propensity to neglect the rudimentary tactics, such as step, distance, alignment, position and duty of guides, pivotmen, etc.

On the whole, we have much to commend and little to criticize in the examination of this year.

The accompanying suggestions relative to instruction in Signal service, by Mr. Stowe, are heartily approved by us all, and we commend the same to your careful consideration.

All of which are respectfully submitted.

R. B. CRAUFURD,
THOMAS McMANUS,
WILLIAM H. STOWE,
Examining Board.

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REPORT

REGARDING

COLLECTION OF PENSIONS, BOUNTIES, ETC.

ADJUTANT-GENERAL'S OFFICE,
HARTFORD, CONN., December 1, 1880.

Brigadier-General EDWARD HARLAND,
Adjutant-General State of Connecticut:

GENERAL,—I have the honor to submit my report of the business prosecuted through the office during the past year in the collection of Pensions and Bounties for soldiers and their heirs.

For the first seven months of the year the number of new claims presented for pension exceeded that of any year since 1867, the number filed in that period being 245. This was owing to the fact that under the Arrears Act the time for filing claims covering arrears of pension from date of discharge expired June 30, 1880. After that date all claims filed will cover pension only from date of filing in Pension Office.

The pension office has been nearly swamped with the avalanche of new claims filed under the Arrears Act, and the large amount of work required to prepare, number and file these claims has seriously interfered with the settlement of old claims, and I am not able to report as large a number of our claims settled as in 1879.

The period of filing claims under the Arrears Act began January 25, 1879, and, as stated before, closed June 30, 1880, and within that time 225,363 new claims were filed, and there are about 290,000 claims remaining unsettled. It has been calculated that if all these claims should be allowed they would amount to the large sum

of $310,000,000, and after that the amount for annual payments for a number of years would be over $50,000,000. The amount paid by the Pension Office for the fiscal year ending June 30 was over $36,000,000, and the estimates for 1881 call for a full $50,000,000. These large amounts so greatly exceed the estimates, if any were made, on the Arrears Bill that it is not likely that Congress will ever re-enact or extend that law.

Under the present system of settling pension claims it would appear that it would take at least fifteen years to examine and settle the large number that have accumulated, and this accumulation and delay leads to and causes another embarrassment to the Pension Office, in the fact that many claimants are continually writing or prevailing on some friend of influence to write the Commissioner inquiring how their claims stand. The labor of examining these cases and answering the letters keeps a large force of clerks busy and seriously retards the business of the office. If every claimant who writes to the Pension Office could see that by so doing he delays the settlement of his own claim, I think he would be disposed to let the Commissioner have all his clerks for regular duty. That the avalanche of letters and inquiries poured in to the Commissioner seriously delays the regular work of the office there can be no doubt. Patience is necessary and requisite to those persons now having claims unsettled.

The system of adjudicating pension claims is one that receives much criticism, and it has been hoped that Congress would not adjourn until a new law for settling claims had been enacted. For the benefit of honest and deserving claimants and the protection of the Government from extensive frauds, some radical change in the present law is necessary, and that immediately. Under the present system fraudulent claims are too easily obtained, to the delay and injury of those more deserving.

I have the pleasure to report that after a number of years of labor I have succeeded in effecting a change in the date of enlistment of the original members of the Fifth

Regiment to date prior to July 22, 1861, and through this those members who served less than two years and have not received the $100 bounty under Act of April 22, 1872, can now obtain it. The old claims have been reopened and are now approaching a settlement, but owing to some unfortunate delays I am afraid that the appropriation necessary to pay these claims will not be made by the present Congress. If such proves to be the fact, a year must elapse before the claimants can receive their money. This is aggravating, as these men were entitled to their money years ago.

The records of the office show that the number of pension claims filed during the year is as follows:

Invalid Soldiers	180
Invalid Increase	26
Widows	21
Minor Children	8
Mothers	19
Fathers	8
Widows War of 1812	7
Restoration	4
Total Pension Claims	273
Number of Claims filed for Arrears of Bounty	86
Number filed for Additional Bounty (Act of July, 1866)	7
Number filed for Veteran Bounty	2
Number filed for Bounty Land	1
Number filed for Arrears of Pay	4
Number filed for Commutation of Rations	3
Total Bounty and Pay Claims	103
Total Claims	376

The number of Pension Claims settled during the year is 79, of which number 68 have been granted and 11 rejected. The amount collected on the first payment of the 68 claims was $43,257.75, which is $15,815.75 larger than the amount represented by the 116 claims favorably settled in 1879. The average amount paid on the 68 claims was $636.

The highest pension paid to enlisted men is $72 per month, and the lowest is $1 per month.

Widows, mothers and fathers of enlisted men are entitled to $8 per month, and where a widow has minor

children they are entitled to $2 per month each additional. The rates of pensions for soldiers is from $1 to $8 per month, with rates for special cases as follows: The loss of a leg below the knee, or an arm below the elbow, entitles to $18 per month, and if above the knee or elbow, to $24 per month, and with leg amputated at hip joint to $37.50 per month. The loss of both an arm and a leg entitles to $36 per month, and the loss of both hands, or both feet, or both eyes, entitles to $72 per month.

Soldiers permanently and totally helpless and requiring personal aid are entitled to $50 per month. The loss of hearing of both ears, entitles to $13 per month.

The execution of Pension Vouchers is a branch of the business which occasions considerable labor for the two weeks immediately after the fourth days of March, June, September and December.

The number of Vouchers executed during the year, and the amounts collected thereon, is as follows:

Vouchers executed for December quarter, 1879	190	
Amount collected		$9,742.36
Vouchers executed for March quarter, 1880	189	
Amount collected		5,750.27
Vouchers executed for June quarter, 1880	190	
Amount collected		9,351.35
Vouchers executed for September quarter, 1880	193	
Amount collected		6,862.63
Total vouchers executed	762	
Total amount collected		$31,706,61
Amount collected on vouchers executed in this office since June, 1871		$266,856.08

The headstones provided for soldiers who served during the war, wherever buried, are now being received from the Quartermaster General, U. S. A.

Thanking you for your uniform kindness and courtesy during your official term,

I am, General, very respectfully,

Your obedient servant,

SIMEON J. FOX,

Assistant Adjutant-General.

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General Orders and Circulars.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, February 18, 1880.

General Orders, No. 1.

I. The attention of commanding officers of the National Guard is again called to General Orders, No. 2, A. G. O., dated March 30, 1878, and to General Orders, No. 4, A. G. O., dated April 10, 1879, regarding target practice. It is desired and expected that every member of the National Guard will be instructed in target practice, as required by the orders referred to. The report of the Brigade Inspector of Target Practice for 1879 shows that this very important branch of a soldier's duties has, in some companies, been entirely neglected.

It is not the desire to make a few superior marksmen in each regiment, but to give every member of the National Guard thorough instruction in this, the most important branch of a soldier's duties.

II. The companies of the Independent Battalion are, for the purpose of receiving instruction in Target Practice, placed in charge of the Regimental Inspector of Target Practice of the Regiment in whose district the company is located.

The Brigade Inspector of Target Practice is authorized to call for reports from Regimental Inspectors at any time, in order to ascertain how the companies are carrying out the practice required.

III. Each company will hereafter be allowed 30 cartridges per year for every officer and enlisted man who appeared at the previous annual muster, and the same number for each recruit after that date, above the total number at muster, not over 1,000 to be issued on any one requisition.

The same allowance of cartridges per man is authorized at Brigade and each Regimental and Battalion headquarters, exclusive of Band.

Returns of cartridges expended will be required as heretofore.

By order of the Commander-in-Chief:

EDWARD HARLAND,

Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, Feb. 26th, 1880.

General Orders, No. 2.

The designation of the Independent Battalion, Connecticut National Guards, Major William H. Layne, Jr., commanding, is hereby changed to the 5th Battalion.

By order of the Commander-in-Chief:

EDWARD HARLAND,
Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, April 15, 1880.

General Orders, No. 3.

I. In Companies of the National Guard consisting of over sixty-six officers and enlisted men, enlistments will cease until the Company falls below that number.

II. Each Company of Infantry of the National Guard will consist of one Captain, one First Lieutenant, one Second Lieutenant, one First Sergeant, four Sergeants, eight Corporals, two Musicians, and not more than forty-eight nor less than thirty-two Privates: provided, that this shall not apply to Companies now numbering over sixty-six officers and enlisted men, until by discharge they are reduced to that number.

III. As Upton's Tactics, now in use by the National Guard, designate two pieces of Artillery as a Platoon, the Sections of Artillery, Connecticut National Guard, will hereafter be known as Platoons of Artillery, retaining the same numerical designation.

By order of the Commander-in-Chief:

EDWARD HARLAND,
Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, April 27, 1880.

General Orders, No. 4.

The parades of the National Guard for the ensuing year will be as follows:

I. The First and Third Regiments, the Fifth Battalion, and the Artillery, will parade by company one day during the month of May. The Second and Fourth Regiments will parade by regiment one day in May within the Regimental District.

II. The First and Third Regiments and the Artillery will encamp for six days, under the command of the Brigadier-General, between the tenth day of August and the twentieth day of September. The Second and Fourth Regiments and the Fifth Battalion will parade by company one day between the tenth day of August and the twentieth day of September.

III. If in any Regiment or Battalion, where the parades are ordered by company, two or more companies desire to parade as a Battalion, the com-

manding officer may order a parade of said companies under the command of a Field Officer, provided such parade shall be without extra expense to the State.

IV. By authority of Joint Resolution of the General Assembly, approved March 24, 1880, the spring parade of the Second Regiment may be in the month of June instead of May if it is so desired.

V. The Fourth Regiment having been invited to participate in the dedication of a Soldiers' Monument at Danbury, May 27, the commanding officer is authorized to order the spring parade of his command on that date, and to participate in the ceremonies indicated, giving his command all the drill the exigencies of the occasion will allow. All other parades of the National Guard will be for drill.

VI. Brigadier-General S. R. Smith, commanding National Guard, will issue the necessary orders for the parades as directed above.

By order of the Commander-in-Chief:

EDWARD HARLAND,
Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, June 15, 1880.

General Orders, No. 5.

I. The attention of commanding officers of the National Guard is called to so much of Section 5, Chapter CXXVI, Public Acts of 1879, page 28, Militia Law, which requires that every uniform furnished by the State to the Active Militia shall remain in the armory or band room, except when worn in the discharge of military duty.

The law is imperative, and the use of uniforms, parts of uniforms, or any other State property in possession of the National Guard, for other than military duty, is strictly prohibited.

II. The parade of any portion of the National Guard in State Uniform or with State Arms must in all cases be under proper orders or by requisite permission.

Permission for the parade of any portion of a Battalion or Regiment will be accorded by the commanding officer thereof, for the Artillery by the Brigadier-General, and for Battalions or Regiments by the Brigadier-General on approval of the Commander-in-Chief.

Permission for any organization to leave the State will only be accorded by the Commander-in-Chief.

When an officer has any doubt regarding the propriety of a parade, he will forward the application to this office for the decision of the Commander-in-Chief.

By order of the Commander-in-Chief:

EDWARD HARLAND,
Adjutant-General.

GENERAL HEADQUARTERS, STATE OF CONNECTICUT,
ADJUTANT-GENERAL'S OFFICE,
HARTFORD, July 1, 1880.

GENERAL ORDERS, NO. 6.

I. In accordance with the provisions of Sec. 9, Chap. I, Title X, of the General Statutes, the following persons are appointed Post Surgeons, to determine exemptions from military duty by the standard of disability prescribed by the Surgeon-General:

Hartford County—Eli Warner, Hartford; George Clary, New Britain; Edward F. Parsons, Enfield; I. P. Fiske, Southington; Henry C. Bunce, Glastonbury; George F. Lewis, Canton; G. W. Edwards, Granby; Henry E. Way, Bristol; Charles Carrington, Farmington.

New Haven County—W. R. Bartlett, New Haven; Alfred North, Waterbury; N. Nickerson, Meriden; George L. Beardsley, Derby; W. H. Andrews, Milford; G. P. Reynolds, Guilford; J. D. McGaughey, Wallingford.

Middlesex County—Francis D. Edgerton, Middletown; John H. Grannis, Old Saybrook; M. C. Hazen, Haddam; Nathaniel O. Harris, East Haddam; W. S. Miller, Clinton; Edwin Bidwell, Saybrook.

New London County—Francis N. Braman, New London; S. L. Sprague, Norwich; E. Frank Coates, Stonington; Seth L. Chase, Colchester; George W. Harris, Old Lyme.

Windham County—William A. Lewis, Plainfield; John B. Kent, Putnam; T. Morton Hills, Willimantic; A. S. Leonard, Woodstock; Samuel Hutchins, Killingly.

Tolland County—S. G. Risley, Rockville; C. B. Newton, Stafford Springs; Henry S. Dean, South Coventry.

Fairfield County—George F. Lewis, Bridgeport; W. C. Burke, Norwalk; William C. Bennett, Danbury; W. H. Trowbridge, Stamford; Wm. C. Wile, Newtown; Sylvester Mead, Greenwich; Wm. S. Todd, Ridgefield.

Litchfield County—Willis J. Beach, Litchfield; John H. Blodgett, Salisbury; James Hine, New Milford; James Welch, West Winsted; Francis W. Brown, Woodbury; Edward Sanford, Cornwall.

II. All persons between 18 and 45 years of age, desiring exemption from military duty and commutation tax, by reason of mental or physical disability, must report to one of the Post Surgeons for examination, and if found exempt, will be furnished with a Certificate of Exemption, to be filed by them with the Selectmen of the Town where they are liable to enrolment. Those who were exempted by Post Surgeons in 1878 and 1879, and the disability classed as permanent, will not be required to be examined again, unless ordered by the Surgeon-General. The dates for examination are as follows: July 14, 21 and 28, August 4, 11, 18 and 25, from 2 to 9 p. m. Persons not filing their Certificate of Exemption with the Selectmen before the first day of September will be debarred from exemption for the year.

III. Post Surgeons are required to make exemptions strictly in accordance with the orders of the Surgeon-General, and will on the 1st of September report to him the names of all exempted by them, with town and disability, and the names of all examined and not exempted. The fee for examination will be paid by this office upon the report made to the Surgeon-General.

Blanks for Certificates of Exemption and Reports to Surgeon-General will be supplied from this office.

By order of the Commander-in-Chief.

EDWARD HARLAND,

Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, August 7, 1880.

General Orders, No. 7.

I. The Board for examination of Officers of the Connecticut National Guard, appointed in General Orders No. 6, A. G. O., August 12, 1879, and consisting of General R. B. Craufurd, Major Thomas McManus and Major William H. Stowe, is hereby continued, and will convene at the Brigade Encampment at Niantic, on Wednesday, the 25th day of August, 1880, at 10 o'clock a. m.

II. The following-named Officers are ordered to appear before said Board for examination, the officers of the First and Third Regiments on Wednesday, the 25th instant, and the Officers of the Second and Fourth Regiments and the Fifth Battalion on Thursday, the 26th instant.

FIRST REGIMENT.

Captain	Joseph Reed,	First Lieut.	Arthur J. Wetherell,
Captain	Patrick J. Moran,	First Lieut.	John Abbey,
Captain	Arthur B. Keeney,	Second Lieut.	Patrick H. Smith,
Captain	Thomas J. Rigney,	Second Lieut.	Thos. H. Montgomery,
First Lieut.	Thomas F. Flanigan,	Second Lieut.	Frank Karber.

SECOND REGIMENT.

Captain	George S. Arnold,	Second Lieut.	James Horrigan,
Captain	Luzerne I. Thomas,	Second Lieut.	Frank A. Bowman,
Captain	Henry J. Bacon,	Second Lieut.	Richard W. Waite,
First Lieut.	Thomas White,	Second Lieut.	William Collins,
First Lieut.	George Lawrence,	Second Lieut.	Joseph T. Elliott,
First Lieut.	Frank E. Nourse,	Second Lieut.	John B. Doherty.
First Lieut.	Frank R. White,		

THIRD REGIMENT.

Captain	Daniel O'Neill,	Second Lieut.	Daniel Keleher,
Captain	Seth C. Spaulding,	Second Lieut.	William C. Jones,
First Lieut.	James O'Sullivan,	Second Lieut.	Arthur L. Story,
First Lieut.	Henry J. Hill,	Second Lieut.	Frank E. Thompson,
First Lieut.	Hiram Franklin,	Second Lieut.	Joseph H. Maynard,
First Lieut.	Danforth Clements,	Second Lieut.	Charles W. Harrington.
First Lieut.	William M. Snow,		

FOURTH REGIMENT.

Captain	Henry M. Blakeslee,	First Lieut.	Francis A. King,
Captain	John H. Slocum,	Second Lieut.	James W. Scofield,
Captain	Addison A. Betts,	Second Lieut.	Franklin P. Perkins.
Captain	George W. Cornell,	Second Lieut.	Cornelius Delury,
First Lieut.	Samuel Cone,	Second Lieut.	William R. Phillips,
First Lieut.	Edward Finn,	Second Lieut.	Alvan A. Hauschildt.
First Lieut.	Ferd. B. Smith,	Second Lieut.	George L. Dickens.
First Lieut.	Edward F. Jennings,	Second Lieut.	Wilfred T. Van Yorx.

FIFTH BATTALION.

Major	Wm. H. Layne, Jr.,	First Lieut.	Luther Harris,
Capt. & Adj.	Charles S. Tatten,	Second Lieut.	Andrew Marshall,
Captain	John W. Williams,	Second Lieut.	William H. Lattimer.
First Lieut.	Robert Butler,		

III. The Quartermaster-General will provide an office for the Board, and the Paymaster-General will pay the officers of the Second and Fourth Regiments and Fifth Battalion, reporting for examination, their transportation and the per diem pay and allowances as provided by law for regular duty.

IV. Each officer appearing before the Board will be examined in a thorough course of tactics required for the proper performance of the duties of his position, and return will be made to this office, giving the name and rank of each officer examined, the result of the examination, and such other information and suggestions as the Board may think proper.

V. The members of the Board will be allowed compensation, as provided by paragraph IX of General Orders, No. 1, series of 1872.

By order of the Commander-in-Chief,

EDWARD HARLAND,

Adjutant-General.

GENERAL HEADQUARTERS, STATE OF CONNECTICUT,
ADJUTANT-GENERAL'S OFFICE,
HARTFORD, October 12, 1880.

GENERAL ORDERS, No. 8.

I. The following named officers of the Connecticut National Guard, having passed a satisfactory examination in military tactics, will be commissioned with rank and date as given herewith:

FIRST REGIMENT.

Captain	Joseph Reed,	Co. I, Windsor Locks,	Oct. 15, 1878.
Captain	Patrick J. Moran,	Co. B, Hartford,	Aug. 22, 1879.
Captain	Arthur B. Keeney,	Co. G, Manchester,	Sept. 1, 1879.
Captain	Thomas J. Rigney,	Co. C, Vernon,	Dec. 12, 1879.
First Lt.	Thomas F. Flanigan,	Co. B, Hartford,	Aug. 22, 1879.
First Lt.	Arthur J. Wetherell,	Co. G, Manchester,	Sept. 1, 1879.
Second Lt.	Patrick H. Smith,	Co. B, Hartford,	Aug. 22, 1879.
Second Lt.	Thomas H. Montgomery,	Co. G, Manchester,	Sept. 1, 1879.
Second Lt.	Frank Karber,	Co. C, Vernon,	Apr. 23, 1880.

SECOND REGIMENT.

Captain	George S. Arnold,	Co. F, New Haven,	July 28, 1879.
Captain	Luzerne I. Thomas,	Co. D, New Haven,	Jan. 6, 1880.
Captain	Henry J. Bacon,	Co. H, Middletown,	Mar. 23, 1880.
First Lt.	George Lawrence,	Co. D, New Haven,	Jan. 6, 1880.
First Lt.	Frank E. Nourse,	Co. H, Middletown,	Mar. 23, 1880.
First Lt.	Frank R. White,	Co. A, Waterbury,	May 20, 1880.
Second Lt.	James Horigan,	Co. G, Waterbury,	Aug. 11, 1879.
Second Lt.	Frank A. Bowman,	Co. F, New Haven,	Dec. 1, 1879.
Second Lt.	Richard W. Waite,	Co. D, New Haven,	Jan. 6, 1880.
Second Lt.	William Collins,	Co. I, Meriden,	Jan. 22, 1880.
Second Lt.	Joseph T. Elliott,	Co. H, Middletown,	Mar. 23, 1880.
Second Lt.	John B. Doherty,	Co. A, Waterbury,	May 20, 1880.

THIRD REGIMENT.

Captain	Daniel O'Neill,	Co. K, Windham	Aug. 21, 1879.
Captain	Seth C. Spaulding,	Co. H, Killingly,	Jan. 17, 1880.
First Lt.	James O'Sullivan,	Co. B, Stonington,	Aug. 18, 1879.
First Lt.	Henry J. Hill,	Co. A, Groton,	Oct. 1, 1879.
First Lt.	Danforth Clements,	Co. F, Putnam,	Feb. 18, 1880.
First Lt.	William M. Snow,	Co. K, Windham,	July 26, 1880.
Second Lt.	Daniel Keleher,	Co. B, Stonington,	Aug. 18, 1879.
Second Lt.	William C. Jones,	Co. A, Groton,	Oct. 1, 1879,
Second Lt.	Arthur L. Story,	Co. C, Norwich,	Dec. 22, 1879.
Second Lt.	Charles W. Harrington,	Co. K, Windham,	July 26, 1880.

FOURTH REGIMENT.

Captain	Henry M. Blakeslee,	Co. K, Stratford,	Nov. 18, 1878.
Captain	John H. Slocum,	Co. I, Winchester,	Apr. 5, 1880.
Captain	Addison A. Betts,	Co. F, Norwalk,	May 4, 1880.
Captain	George W. Cornell,	Co. B, Bridgeport,	July 13, 1880.
First Lt.	Samuel Cone,	Co. H, Litchfield,	Nov. 14, 1879.
First Lt.	Edward Finn,	Co. I, Winchester,	Apr. 5, 1880.
First Lt.	Ferdinand B. Smith,	Co. F, Norwalk,	May 4, 1880.
First Lt.	Edward F. Jennings,	Co. D, Norwalk,	May 21, 1880.

First Lt.	Francis A. King,	Co. B, Bridgeport,	July 13, 1880.
Second Lt.	James W. Scofield,	Co. K, Stratford,	Nov. 18, 1878.
Second Lt.	Franklin P. Perkins,	Co. H, Litchfield,	Nov. 14, 1879.
Second Lt.	Cornelius Delury,	Co. G, Danbury,	Jan. 12, 1880.
Second Lt.	William B. Phillips,	Co. I, Winchester,	Apr. 5, 1880.
Second Lt.	Alvan A. Hauschildt,	Co. D, Norwalk,	May 21, 1880.
Second Lt.	Wilfred T. Van Yorx,	Co. B, Bridgeport,	July 13, 1880.

FIFTH BATTALION.

Major	William H. Layne, Jr.,	New Haven,	Aug. 28, 1879.
Captain	Charles S. Tatten,	Adjt., Norwich,	Dec. 20, 1879.
Captain	John W. Williams,	Co. D, Norwich,	Dec. 30, 1879.
First Lt.	Robert Butler,	Co. C, Bridgeport,	Sept. 25, 1879.
First Lt.	Luther Harris,	Co. D, Norwich,	Dec. 30, 1879.
Second Lt.	William H. Latimer,	Co. C, Bridgeport,	Mar. 2, 1880.

II. The following named officers of the Connecticut National Guard, not being required to pass an examination in military tactics, or having previously passed an examination for a corresponding rank, will be commissioned with date and rank as given herewith:

SECOND REGIMENT.

Captain	Andrew Allen,	Insp'r Target Practice,	New Haven,	Jan. 5, 1880.
Captain	Frederick E. Camp,	Adjutant,	Middletown,	Apr. 15, 1880.

FOURTH REGIMENT.

First Lt.	Henry N. Fanton,	Quartermaster,	Danbury,	Feb. 15, 1880.

FIFTH BATTALION.

First Lt.	Joshua L. Howard,	Quartermaster,	New Haven,	Dec. 20, 1879.
First Lt.	Courtlandt V. R. Creed,	Asst. Surgeon,	New Haven,	Dec. 20, 1879.

III. The following named officers of the Connecticut National Guard, having failed to appear before the Board for examination in military tactics, or to present a satisfactory excuse for not appearing, their appointments are hereby revoked:

First Lt.	Thomas White,	Company G,	Second Regiment.
Second Lt.	Frank E. Thompson,	Company H,	Third Regiment.
Second Lt.	George L. Dickens,	Company A,	Fourth Regiment.

IV. The following named officers of the Connecticut National Guard, having failed to pass a satisfactory examination in military tactics, their appointments are hereby revoked:

First Lt.	John Abbey,	Company C,	First Regiment.
First Lt.	Hiram Franklin,	Company H,	Third Regiment.
Second Lt.	Joseph H. Maynard,	Company F,	Third Regiment.
Second Lt.	Andrew Marshall,	Company D,	Fifth Battalion.

V. In any company, where a vacancy has been caused by this order, the commanding officer will give proper warning to the members of the company to appear at the armory and make nominations to fill such vacancy, and make return of such nominations to this office without delay.

By order of the Commander-in-Chief,

EDWARD HARLAND,

Adjutant-General.

GENERAL HEADQUARTERS, STATE OF CONNECTICUT,
ADJUTANT GENERAL'S OFFICE,
HARTFORD, October 18, 1880.

GENERAL ORDERS, NO. 9.

The Commander-in-Chief, in publishing herewith the report of Colonel Roger Jones, Assistant Inspector-General U. S. A., of his inspection of that portion of the National Guard encamped at Niantic in August last, desires to thank the officers and men for their strict attention to duties and their uniform good behavior during the camp, as evidenced to himself and the members of his staff on duty at the encampment. He believes the words of commendation expressed by Colonel Jones well merited.

The attention of all Officers and Non-Commissioned Officers of the Guard is especially called to that portion of the report which refers to study of Tactics. This is an important part of an officer's duty, and one that requires strict attention, that the drill and discipline of the command may not suffer. Your standard of drill and discipline should be increased yearly, that it may remain, as at present, the pride of yourselves and the entire State.

It is believed that the presence of Colonel Jones at the encampment, and his report, will inure to your benefit, and that the interest of the War Department in the active militia is increasing, and will be of great good to them and to us.

This order will be read to each Company at the November inspection and muster.

HEADQUARTERS OF THE ARMY.
INSPECTOR-GENERAL'S OFFICE,
SEPTEMBER 6, 1880.

To the Adjutant-General U. S. Army.

GENERAL,—In pursuance of the instructions of the Honorable Secretary of War, which you communicated to me on July 23d, I attended, during the past week, the encampment of the Connecticut National Guard at Niantic, arriving there early in the morning following the assembling of the troops, and remaining in camp until the day it was broken up.

During this time I was constantly on hand witnessing the drills, parades, reviews, and inspections, being on the field with the troops nearly the entire time they were under arms.

The troops at this encampment consisted of the First and Third Regiments and two sections of Artillery. The First Regiment was commanded

by Colonel Barbour; the Third by Colonel Tubbs; the Artillery by Lieut. Lee, and the Encampment by Brig.-General S. R. Smith.

The entire week was devoted to instruction, there being three drills daily, one company drill and two battalion drills. In addition there were reviews, inspections, and other ceremonies, which consumed, all told, something like six hours a day.

As was to have been expected at the opening of the encampment, these troops showed the want of practice and instruction on the part of both officers and men, but it was not in the nature of things for it to have been otherwise, considering that both rank and file are engaged in daily labor absolutely necessary for the maintenance of themselves and their families. The surprise is that their appearance should have been so creditable as it was. The close of the week of training showed the time had been profitably spent, but if the officers could have given more time to their personal instruction before coming to camp, as well as after their arrival, the benefit to the regiment, as a body, would have been much more marked, and their personal satisfaction must thereby have been much enhanced.

However, even as it was, I much doubt if there are many regiments in our army, after having been assembled so short a time, which would have surpassed the First Regiment in the manual of the arms, in steadiness on the march and in ranks, in firmness and regularity of step, or who would have formed more promptly and performed the battalion manœuvres with more skill. The causes for the superiority, in these particulars, of the First over the Third Regiment are well known to the Brigade Commander and to the Governor's Staff, as also to the Regimental Officers themselves, and the fact that there is a marked difference in the two regiments is in no wise discreditable to the Third.

The Battery manœuvres were executed remarkably well as a rule, and it was difficult for me to account for the drivers and cannoniers being so well drilled and instructed. To the Battery commander, Lieut. Lee, must the credit in the main belong.

Although my visit to this camp was made in compliance with a request of the Governor of the State, and although I was designated for duty by the Honorable Secretary of War, I could not take an active part in the duties of the camp, but I endeavored, in every way that seemed advisable and proper, to aid the officers of the command in making the most of their opportunity.

That some advantage may result from my visit and the associations I formed may reasonably be expected; but the benefits are not all on one side, for I feel I too have profited by the opportunity afforded me of being present at this encampment. The interest manifested by the general government in sending officers of the army to the encampment of State troops must tend to keep alive and promote in the members of these organizations, in both officers and men, a much more earnest zeal than would otherwise exist. Indeed, such opinions were freely and frequently expressed to me at the camp at Niantic.

These troops—First and Third Regiments—are armed with breech-loading muskets of the Peabody and Springfield models, and are well clothed and equipped. In a word, it may be said, they are well organized and officered,

and in a condition to respond promptly to any call for service that may be made on them by their Commander-in-Chief.

If I were called on or expected to make any suggestions calculated to advance the efficiency of these organizations, and enable them when next assembled in camp to reap the greatest advantage from the opportunity afforded them, I would strongly urge the study of tactics by company officers and non-commissioned officers. By thus perfecting themselves in advance in knowledge of their duties in the school of the company, they would experience comparatively little difficulty in readily acquiring those which arise when assembled for instruction in the school of the Battalion.

Much as the State authorities have done to bring these troops into their present creditable condition, more attention in this direction would doubtless be productive of a very decided improvement which would reflect additional credit upon both the troops and the State to which they belong.

The morning report of the 28th of August, the day of the breaking up of camp, was as follows:

	PRESENT.			ABSENT.			AGGREGATE.
	Officers.	Men.	Total.	Officers.	Men.	Total.	
First Regiment	40	576	616		68	68	684
Third Regiment	38	518	556	2	76	78	634
First Platoon Artillery	2	34	36		3	3	39
Second Platoon Artillery	2	32	34		1	1	35
Total	82	1160	1242	2	148	150	1392

In concluding this report I desire to make my acknowledgment for courtesies and hospitalities extended me by all with whom I was brought in contact during my attendance at this encampment.

Very respectfully your obedient servant,

(Signed,) R. JONES,

Lieut.-Col., Asst. Inspector-General.

By order of the Commander-in-Chief:

EDWARD HARLAND,

Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, October 30, 1880.

General Orders, No. 10.

I. The Connecticut National Guard will be mustered and inspected between the 10th and 30th days of November, 1880, the First and Second Regiments by Lieutenant-Colonel Lewis L. Morgan, Brigade Adjutant.

The Third and Fourth Regiments by Major John B. Clapp, Brigade Inspector.

The Artillery and Fifth Battalion by Lieutenant-Colonel Simeon J. Fox, Assistant Adjutant-General.

II. The Mustering Officers will assign dates for muster of various companies as soon as possible, and the proper officers will issue instructions for assembling the companies in accordance with dates assigned.

III. Commanding Officers will have their Muster Rolls properly made out previous to date of muster, on the new blank rolls issued in 1878, and will see that all recruits are examined by the Surgeon, and their enlistment papers forwarded to this office at or before muster.

IV. The rolls must account for every commissioned officer and enlisted man whose name appeared on the last Muster Roll of the command, and those who have joined the organization since that date, and will give all the information provided for by the blanks furnished. The Mustering Officer will scrutinize the rolls carefully, and see that they are properly made according to directions on the blank and orders from this office.

V. The Muster will be preceded by a minute and careful inspection according to United States Infantry Tactics, and the Mustering Officers will report to this office the quality and condition of the uniforms, arms, and equipments of the officers and men, their discipline, drill, and appearance, with such other information as in their opinion will be useful to the Commander-in-Chief.

By order of the Commander-in-Chief:

EDWARD HARLAND,
Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, November 10, 1880.

General Orders, No. 11.

I. So much of Special Orders, No. 24, dated March 28, 1880, as discharges Privates Peter Gardner and Jesse Minor, Co. "F," Third Regiment, C. N. G. from the military service of the State is hereby revoked, the report of the Board of Examiners appointed by Special Orders, No. 40, dated June 16, 1880, showing that the men named had not been guilty of insubordination, or that their discharge would be for the good of the company and service, as stated by their commanding officer, Captain Warren.

The names of Peter Gardner and Jesse Minor will be again placed on the rolls of Co. "F," Third Regiment, with date from original enlistment, and they will report for duty.

II. Captain George Warren, Co. "F," Third Regiment, Connecticut National Guard, is hereby dismissed from the military service of the State, the report of the Military Board of Examiners appointed by Special Orders, No. 40 c. s., showing that he has been guilty of giving false reasons for discharge of two members of his command, and of appropriating company funds, and rendering fictitious accounts therefor.

III. The nomination of Joseph H. Maynard as Second Lieutenant, Co. "F," Third Regiment, is disapproved, he having failed to pass a satisfactory examination in military tactics at the last session of the Examining Board.

IV. Lieut. Danforth Clements, Co. "F," Third Regiment, C. N. G. will give legal notice to the members of said Company to appear at their Armory at as early a date as practicable, and lead them to nominate by ballot a Captain and Second Lieutenant, and in like manner make nominations for any vacancies in the Commissioned Officers of said Company, occurring by reason of the nominations above ordered, and make return to this office.

V. The members of the Military Board of Examiners appointed by Special Orders, No. 40, c. s. consisting of Colonel Lucius A. Barbour, Captain Frederick A. Spencer, and Lieutenant Samuel O. Prentice, will accept the thanks of the Commander-in-Chief for the thorough manner in which their duty was performed.

By order of the Commander-in-Chief:

EDWARD HARLAND,

Adjutant-General.

General Headquarters, State of Connecticut,
Adjutant-General's Office,
Hartford, November 30, 1880.

General Orders, No. 12.

I. The Marksman's Badges, issued to members of the National Guard qualifying as Marksmen in 1879, can be retained by them as their personal property. The Quartermaster-General will relieve commanding officers oi all responsibility for Marksman's Badges issued for qualifications in 1879.

II. Marksman's Badges will until further orders, be issued for those members who have qualified as Marksmen for the first time since 1878. For members for whom badges have been issued since 1878, the clasps or bars only will be issued on all future qualifications as marksmen.

III. Paragraph II. of General Orders, No. 14, series of 1878, is hereby revoked.

By order of the Commander-in-Chief:

EDWARD HARLAND,

Adjutant-General.

REPORT

OF THE

Quartermaster General

OF THE

STATE OF CONNECTICUT,

TO THE

GENERAL ASSEMBLY,

JANUARY SESSION, 1881.

PRINTED BY ORDER OF THE LEGISLATURE.

HARTFORD:
PRESS OF WILEY, WATERMAN & EATON.
1881.

State of Connecticut.

AUDITORS' REPORT.

To the Honorable the General Assembly of the State of Connecticut:

The undersigned, Auditors of the accounts of the Quartermaster-General for the year ending November 30, 1880, have attended to their duties, and respectfully report:

That we have examined the books and accounts of the office and found them correct, and the vouchers for all payments on file; that since our last inspection a substantial wrought iron fence has been erected, and the Arsenal buildings thoroughly painted and put in good repair, while all other State property appears to have been well cared for; and the auditors are pleased to testify that, in their opinion, the duties of this department have been performed in a capable and faithful manner by Quartermaster-General Wessells, and his assistant, Major T. C. Swan.

DAVID P. NICHOLS,
R. W. FARMER, } *Auditors.*

REPORT.

Quartermaster-General's Office,
Hartford, Conn., November 30th, 1880.

To the General Assembly of Connecticut:

I have the honor to present herewith the Annual Report of this Department for the fiscal year ending with above date.

No change has been made in the arms furnished the Connecticut National Guard, the First Regiment having the Springfield breech loading rifle, calibre .45 inch, the Second, Third and Fourth Regiments carrying the Peabody breech loading rifle, calibre .45 inch, the Fifth Battalion the Springfield breech loading rifle, calibre .50 inch, while the two Platoons of Artillery have each two six-pounder guns, with sabres and revolvers.

A very general desire is expressed that an improved sight should be adopted, and such an expenditure would doubtless enable our troops better to compete with those of other states who are provided with more modern sights, and I have hesitated about making the change only because other and unlooked for expenditures have carried the expenses of this Department considerably in excess of the estimate.

In accordance with the wishes of the officers of the First, Third and Fourth Regiments, I have called in and altered

their equipments, discarding cross belts, which is generally considered a decided improvement on the former cumbersome style, as well as a great saving in the wear of uniforms.

ARMORIES AND INSPECTION.

The Union Armory in this city, described in my last report, has been completed and in use since the first of February last, and new armories furnished at Willimantic, Danbury and Bethel. Additional room has also been provided at several other points for the better protection of State property, and the troops are now very generally well furnished in this regard.

The inspection of Armories and State property lately completed by this Department has proved satisfactory, and with two or three exceptions all that could be desired, while the arms and equipments loaned by the State to independent organizations and schools exhibit no want of care.

CLOTHING.

Since my last report the First and Third Regiments of Infantry, the two Platoons of Artillery, and the First Company Governor's Foot Guard have been supplied by this Department with new overcoats and the blankets in their possession called in.

The severe storm that occurred during the last encampment proved satisfactorily, I believe, the change to have been most beneficial to the health and comfort of the troops. The Second and Fourth Regiments not being called into camp this year I thought best not to furnish them until they should be required. The coats were furnished by Boylan & Co. of New York and are considered first class in make and material.

ENCAMPMENT.

The First and Third Regiments of Infantry, with the two Platoons of Artillery were ordered out for the six days annual encampment.

The camp was located at Niantic on the same ground occupied for that purpose for several years past, and was in all respects successful. Camp equipage was transported from and to the Arsenal without loss, and the camp was pitched and struck by this Department. This plan enables the troops to devote the entire week to military instruction and is a great improvement upon the old system.

EXTRAORDINARY EXPENDITURES.

The larger sums expended by this Department and not included in the estimates are as follows:

75 Set Horse equipments for 2nd Co. Governor's Horse Guard,	$1,888.00
1460 Overcoats,	15,695.00
70 Uniforms for 2nd Co. Governor's Foot Guard,	1,744.50
174 Knapsacks,	609.00
200 Blankets,	400.00
Colors for 2nd Regiment, Fifth Battalion, and Governor's Foot Guard,	421.50
Painting Arsenal Buildings,	416.99
Amounting to	$21,174.99

All these sums I believe to have been properly expended and for the benefit of the service.

ARSENAL BUILDINGS.

At the last session of the Legislature a sum not exceeding sixteen hundred and fifty dollars was appropriated for the construction of a new fence about the grounds of the Arsenal and the Quartermaster-General was directed to build the same under the direction of the Comptroller. A wrought iron fence, seven feet in height, well built, placed and painted, has been completed at a cost of fourteen hundred and eighty-seven dollars and eighty-one cents, while the Arsenal and gun sheds have been thoroughly painted and put in good condition.

I close my official connection with the Connecticut National Guard with regret, and in doing so desire to express to its officers my sincere thanks for the kindness and courtesy extended me at all times; and if, as I trust, their intercourse with this Department has, as a whole been agreeable to them, I hope they will accord much of the credit to Assistant Quartermaster-General Swan, who with my other subordinates have by their fidelity and industry done so much to render the position pleasant to me.

Annexed is the account current of this Department with detailed statement of all public stores under my control.

I am, very respectfully,

L. W. WESSELLS,

Quartermaster-General of Connecticut.

Dr. STATE OF CONNECTICUT IN ACCOUNT WITH

1880.		
Dec. 1.	To amount expended for repairs and improvements on Arsenal grounds and buildings, - - - -	$653.07
	To amount expended for office expenses, - - -	219.92
	" " care public property, - -	2,715.30
	" " postage, - - - - -	76.00
	" " freight and express, - -	243.64
	" " contingent expenses, - -	30.00

CONNECTICUT NATIONAL GUARD AND GOVERNOR'S GUARD.

	To amount expended for encampment and military stores, - - - -	3,363.68
	" " transportation, - - -	3,874.75
	" " equipments, - - - -	4,179.12
	" " uniforms, - - - -	20,317.30
	" " armory rents, - - -	18,123.49
	" " officers' compensation, - -	2,717.14
	" " care of arms, - - -	3,402.18
	" " targets, - - - - -	459.20
	" " ammunition, - - -	1,660.00
	" " uniform compensation, -	1,690.00
	" " uniform repairs, - - -	134.55

SEMI-MILITARY ORGANIZATIONS.

	To amount expended for armory rent Cambridge G'rd Hartford, - - - -	100.00
	" " armory rent, Emmet Guard, New Haven - - -	100.00
	To balance, - - - - - - - - - -	445.25
		$64,504.59

L. W. WESSELLS, QUARTERMASTER-GENERAL. CR.

1879.		
Dec. 1.	By cash balance, - - - - - - -	$650.04
" 4.	By cash on order from Comptroller, - - - -	5,000.00
1880.		
Mch. 4.	" " " " - - - -	5,000.00
April 2.	" " " " - - - -	6,000.00
May 1.	" " " " - - - -	10,000.00
Aug. 18.	" " " " - - - -	20,000.00
Oct. 4.	" " " " - - - -	15,000.00
Nov. 20.	" " " " - - - -	1,000.00
" 30.	" cash from sale of buttons, - - - -	55.51
	" " " arms and accoutrements, -	83.35
	" " officers and others, - - - -	1,715.69
		$64,504.59

PROPERTY RETURN.

CLASS A. CAMP AND GARRISON EQUIPAGE.

	*Headquarter Tents, complete.	†Colonels' Tents, complete.	Wall Tents.	Wall Tent Flies.	Wall Tent Poles, sets.	A Tents.	A Tent Poles, sets.	Marquee Tents.	Marquee Tent Fly.	Marquee Tent Poles, sets.	Bell Tents.	Bell Tent Poles, sets.	Chapel Tents.	Chapel Tent Poles, sets.	Tent Pins, large.	Tent Pins, small.
Remaining on hand November 30, 1879,	2		155	93	243	609	596	4	1	12	18	19	2	2	1,530	8,643
Received from purchase during the year,		2	1		1										1,900	5,000
Received from Connecticut National Guard,																
Total to be accounted for,	2	2	156	93	244	609	596	4	1	12	18	19	2	2	3,430	13,643
Issued to Connecticut National Guard,																
Expended in service by Conn. National Guard,					3		7			3					230	1,000
Expended and dropped,												1				
Sold to officers and others,																
Total issued, expended, dropped and sold,					3		7			3		1			230	1,000
Remaining on hand November 30, 1880,	2	2	156	93	241	609	589	4	1	9	18	18	2	2	3,200	12,643

	Gun Racks.	Tent Guy Handles.	Camp Tables.	Camp Chairs.	Bed Sacks.	Axes.	Axe Helves.	Half Axes.	Pick Axes.	Pick Axe Helves.	Spades.	Shovels.	Mallets.	Candlesticks.	Lanterns.	Wash Basins.	Wood Pails.	Cups, Tinned Iron.
Remaining on hand November 30, 1879,	364	16	10	29	1,460	11	10	3	67	18	26	2	38	891	27	750	72	450
Received from purchase during the year,																	24	108
Received from Connecticut National Guard,					20									20	4	12	8	20
Total to be accounted for,	364	16	10	29	1,480	11	10	3	67	18	26	2	38	911	31	762	104	578
Issued to Connecticut National Guard,					20									20	4	12	8	20
Expended in service by Conn. National Guard,	7				13						1			50	7	5	5	7
Expended and dropped,		16	2	19				1										
Sold to officers and others,																		
Total issued, expended, dropped and sold,	7	16	2	19	33			1			1			70	11	17	13	27
Remaining on hand November 30, 1880,	357		8	10	1,447	11	10	2	67	18	25	2	38	841	20	745	91	551

	Dippers.	Rakes.	Flag Staffs.	Halyards, sets.	Flags, Garrison.	Flags, Storm.	Flag, State.	Camp Colors.	Drums, Snare.	Drum Heads, Snare.	Drum Heads, Batter.	Drum Slings.	Drumstick Carriages.	Drumsticks, pairs.	Drum Covers, Linen.	Drum Cords.	Drum Hoops.	Snares.	Fifes.	Color Belts.
Remaining on hand November 30, 1879,	22	37	2	1	2	3	1	2	30	4		15	19	11	5	8	3	19	6	87
Received from purchase during the year,	24								1	24	36	1		1		12				
Received from Connecticut National Guard,									6			6		4	6					
Total to be accounted for,	46	37	2	1	2	3	1	2	37	28	36	22	19	16	11	20	3	19	6	87
Issued to Connecticut National Guard,									5	8	22	9		7	4	14	1	2		1
Expended in service by Conn. National Guard,	8	7																		
Expended and dropped,						1											2	2		
Sold to officers and others,									3	2	2	2		3		5		1		2
Total issued, expended, dropped and sold,	8	7				1			8	10	24	11		10	4	19	3	5		3
Remaining on hand November 30, 1880,	38	30	2	1	2	2	1	2	29	18	12	11	19	6	7	1		14	6	84

	Knapsacks.	Haversacks.	Canteens.	Skirmishing Bugles.	Bugle Cord and Tassels.	Camp Desks.	Large Tent Stakes.
Remaining on hand November 30, 1879,	51	2,063	2,502	1	1		
Received from purchase during the year,	174			1	1	7	150
Received from Connecticut National Guard,	119						
Total to be accounted for,	344	2,063	2,502	2	2	7	150
Issued to Connecticut National Guard,	220			1	1	6	
Expended in service by Conn. National Guard,							
Expended and dropped,							
Sold to officers and others,							
Total issued, expended, dropped and sold,	220			1	1	6	
Remaining on hand November 30, 1880,	124	2,063	2,502	1	1	1	150

* Consists of large Tents, with Walls, Flies and Poles.

† Consists of large Tents, with Flies and Poles.

PROPERTY RETURN.

CLASS B. CLOTHING.

	Overcoats, Infantry.	Overcoats, Cavalry.	Coats, Infantry, C. N. G.	Pants, Infantry, C. N. G.	Blouses, Infantry, C. N. G.	Fatigue Caps.	Helmets.	Shakos and Pompons.	Plumes.	Epaulettes, pairs.	Coats, Artillery, C. N. G.	Pants, Artillery, C. N. G.	Blouses, Artillery, C. N. G.	Chevrons, pairs.	Blue Army Kersey, yards.
Remaining on hand November 30, 1879,	871	86	....	....	....	....	8	....	..	..	..	..	..	171	39½
Received from Connecticut National Guard,	62	30	124	124	116	121	136	....	.	..	..	..	..	26	....
Received from purchase during the year,	1,460	....	152	152	86	147	52	317	3	69	5	5	5	....	....
Taken up,	......	....	....	....	....	....	....	....	..	..	..	..	..	4	....
Total to be accounted for,	2,393	116	276	276	202	268	196	317	3	69	5	5	5	201	39½
Issued to Connecticut National Guard,	1,317	30	134	134	132	128	112	248	3	..	4	4	4	17	....
Issued to Governor's Foot Guard,	100	....	69	69	....	69	....	69	..	69	..	..	..	....	....
Expended and dropped,	......	....	....	....	....	....	....	....	..	..	..	..	..	....	....
Sold to officers and others,	......	....	....	....	....	....	10	....	..	..	..	..	..	34	39½
Total issued, expended, dropped and sold,	1,417	30	203	203	132	197	122	317	3	69	4	4	4	51	39½
Remaining on hand November 30, 1880,	976	86	73	73	70	71	74	....	..	..	1	1	1	150	....

	Buttons, C. N. G., Officers' large.	Conn. State Buttons, large.	Conn. State Buttons, small.	Conn. State Buttons, Officers' large.	Conn. State Buttons, Officers' small.	Cap Letters, C. N. G.	Cap Numbers, C. N. G.	N. C. O. Sashes.	Wool Blankets.	Scarlet Blankets.	Magenta Blankets.	Blue Blankets.	Blanket Cases.	Overcoat Cases.	Eyelet Hooks.
Remaining on hand November 30, 1879,	192	816	744	440	187	1,743	1,716	46	505	1	4	..	48	..	340
Received from Connecticut National Guard,	....	....	......	....	....	......	......	..	30	472	477	60	14	2	....
Received from purchase during the year,	....	....	432	....	432	......	......	..	200	....	....	..	..	50	....
Taken up,	....	....	......	....	....	......	......	..	....	....	....	..	..	..	....
Total to be accounted for,	192	816	1,176	440	619	1,743	1,716	46	735	473	481	60	62	52	340
Issued to Connecticut National Guard,	....	....	......	....	....	......	......	..	30	....	....	50	2	43	....
Issued to Governor's Foot Guard,	....	....	......	....	....	......	......	..	....	....	...	..	..	3	....
Expended and dropped,	48	....	300	....	....	......	......	..	....	13	....	..	..	..	....
Sold to officers and others,	....	478	732	239	241	......	......	10	4	1	2	..	..	..	....
Total issued, expended, dropped and sold,	48	478	1,032	239	241	......	......	10	34	14	2	50	2	46	....
Remaining on hand November 30, 1880,	144	338	144	201	378	1,743	1,716	36	701	459	479	10	60	6	340

PROPERTY RETURN.

CLASS C. QUARTERMASTER'S STORES.

	Company Chests.	Auger.	Bit Stocks.	Claw Chisel.	Hammers.	Crowbars.	Marking Pots.	Stencil Plates, sets.	Stencil Brushes.	Padlocks, Brass.	Padlocks, Iron.	Candles, pounds.	Soap, pounds.	Markers, C. N. G.	Guidons, Infantry, C. N. G.	Guidon, Light Battery, C. N. G.	Medicine Chests.	Marksmen's Badges.	State Color, Silk.	U. S. Color, Silk.	Flags, Rebel, Trophies.	Saddles.	Bridles.	Collars.	Saddle Cloths.	Cases.
Remaining on hand November 30, 1879,	3	1	11	1	2	2	2	3	3	11	2	14	50	6	1	1	2	484	.	..	5	..	..	..	..	..
Received from Connecticut National Guard,	..	..	..	..	..	..	..	..	..	..	..	....	...	..	..	..	..	....	1	..	..	..	..	..	..	..
Received from purchase during the year,	.	..	..	..	..	..	..	..	..	..	..	280	100	2	2	..	..	100	3	1	..	75	75	75	75	13
Total to be accounted for,	3	1	11	1	2	2	2	3	3	11	2	294	150	8	3	1	2	584	4	1	5	75	75	75	75	13
Issued to Connecticut National Guard,	..	..	..	..	..	..	..	..	..	..	..	....	....	2	2	..	..	538	2	1	..	..	..	..	..	..
Issued to Governor's Guard,	..	..	..	..	..	..	..	..	..	..	..	....	...	..	..	..	..	....	1	..	..	75	75	75	75	13
Expended in service by Conn. National Guard,	..	..	..	..	..	..	..	..	..	..	..	280	125	..	..	..	..	....	..	..	..	..	..	..	..	..
Expended and dropped,	..	..	..	..	..	.	..	..	3	2	..	14	25	..	..	..	..	....	..	..	..	..	..	..	..	..
Total issued, expended and dropped,	..	..	..	.	..	..	..	..	3	2	..	294	150	2	2	..	..	538	3	1	..	75	75	75	75	13
Remaining on hand November 30, 1880,	3	1	11	1	2	2	2	3	..	9	2	....	....	6	1	1	2	46	1	..	5	..	..	..	..	..

PROPERTY RETURN.

CLASS D. ORDNANCE AND ORDNANCE STORES.

SMALL ARMS AND ACCOUTREMENTS.

	RIFLES.													SMOOTH BORE.			PISTOLS.		BAYONETS.								SWORDS.			
	Springfield Breech-loading Rifled Musket, Cal. .45.	Peabody Breech-loading Rifled Musket, Cal. 45.	Whitney Rifle Musket, Cal. .58.	Springfield Rifle Musket, Cal. .58.	Springfield Breech-loading Rifled Musket, Cal. .50.	Mississippi Rifle Musket.	Norfolk Rifle Musket, Cal. .58.	Flint-lock Rifle Musket.	Sharps's Rifle, 36 inch barrel.	Spencer's Rifle.	Colt's Revolving Rifle, Cal. .56.	Sharps's Carbine.	Windsor Rifle.	Cadet Muskets.	Flint-lock Muskets, trophies.	Flint-lock Musket, breech-loader.	Colt's Pistols, Cal. .45.	Whitney Navy Pistols.	For Whitney Rifle Musket.	For Springfield Rifle Musket, Cal. .58.	For Springfield Breech-loading Rifle Musket, Cal. .50.	For Springfield Breech-loading Rifle Musket, Cal .45.	For Peabody Breech-loading Musket, Cal. 45.	For Cadet Musket.	For Flint-lock Muskets, trophies.	Sabre Bayonets.	N. C. O. Swords.	Artillery Sabres.	N. C. Staff Swords.	Musicians' Sword.
Remaining on hand November 30, 1879,	185	104	61	122	295	1	1	1	1	1	1	1	1	23	44	1	160	73	60	124	292	197	104	23	24	3	16	77	13	1
Received from Connecticut State Prison,					12																12									
Received from Robinson Zouaves,					60																60									
Received from purchase during the year,																														
Received from Connecticut National Guard,		120		28																28			120				5	2	3	
Received from bondsmen of D. P. Corbin, deceased,														75										74						
Taken up,																														
Total to be accounted for,	185	224	61	150	367	1	1	1	1	1	1	1	1	98	44	1	160	73	60	152	364	197	224	97	24	3	21	79	16	1
Issued to Connecticut National Guard,	13	50																				17	51						3	
Isssued to Wadham Post, No. 49, G. A. R.,				12																12										
Sold to officers and others,																											10			
Dropped,	2																													1
Total issued, dropped and sold,	15	50		12																12		17	51				11		3	
Remaining on hand November 30, 1880,	170	174	61	138	367	1	1	1	1	1	1	1	1	98	44	1	160	73	60	140	364	180	173	97	24	3	10	79	13	

	ACCOUTREMENTS.																																	
	Cartridge Boxes.	Cartridge Boxes, U. S. Pattern.	Cartridge Box Plates.	Cartridge Box Belts.	Cross Belts.	Cross Belt Plates.	Cross Belt Plates, U. S. Pattern.	Waist Belts.	Waist Belts, U. S. Pattern.	Waist Belt Plates.	Waist Belt Plates, U. S. Pattern.	Bayonet Scabbards.	Bayonet Scabbards, U. S. Pattern.	Bayonet Scabbard Belts.	Cap Pouches.	Cavalry Cartridge Boxes.	Cavalry Cartridge Box Plates.	Gun Slings.	Throgs.	N. C. Staff Cross Belts and Plates.	N. C. O. Waist Belts.	N. C. O. Waist Belt Plates.	N. C. O. Cross Belt Plates.	Musicians' Cross Belts.	Musicians' Cross Belt Plates.	Waist Belts, officers' pattern.	Scabbards for Sabre Bayonets.	Cases, Equipment Packing.	Music Pouches.	Band Waist Belts and Plates.	Artillery Sabre Belts and Plates.	Arm Chests.	Pistol Holsters.	Pistol Packing.
Remaining on hand November 30, 1879,	35	173	133	975	68	950	40	105	115	64	157	67	111	670	230	128	68	146	105	17	15	14	66	139	172	203	3	27	46	43	2	43	70	8
Received from Connecticut State Prison,																																1		
Received from Robinson Zouaves,													60																			3		
Received from purchase during the year,	1																																	
Received from Connecticut National Guard,	687			627		762		676		674		688		630					8	4								4				10		
Received from bondsmen of D. P. Corbin, deceased,																																3		
Taken up,								200		10																					3			
Total to be accounted for,	723	173	133	1,602	68	1,712	40	981	115	748	157	755	171	1,300	230	128	68	146	113	21	15	14	66	139	172	203	3	31	46	43	5	60	70	8
Issued to Connecticut National Guard,	625					26		641		643		626							12									9	21	21		3		
Isssued to Wadham Post, No. 49, G. A. R.,																																1		
Sold to officers and others,	1			1				24	50	25	50		50								10	10				18								
Dropped,				200		10											3				1		3			2								
Total issued, dropped and sold,	626			201		36		665	50	668	50	626	50						12		11	10	3			20		9	21	21		4		
Remaining on hand November 30, 1880,	97	173	133	1,401	68	1,676	40	316	65	80	107	129	121	1,300	230	128	65	146	101	18	4	4	63	139	172	183	3	22	25	22	5	56	70	8

PROPERTY RETURN.

CLASS D. ORDNANCE AND ORDNANCE STORES—Continued.

	FIELD GUNS, HOWITZERS AND GATLING GUNS.													ARTILLERY CARRIAGES.									ARTILLERY EQUIPMENTS AND IMPLEMENTS.																																												
	RIFLED.			SMOOTH BORE.					TROPHIES.														SPONGES, RAMMERS AND STAVES.											MISCELLANEOUS IMPLEMENTS.																									
	6-pdr. Bronze, Cal. 3.80.	6-pdr. Hotchkiss, Cal. 3.40.	12-pdr. Steel Prussian, Cal. 4.58.	12-pdr. Bronze, Cal. 4.62.	6-pdr. Bronze, Cal. 3.67.	12-pdr. Bronze Field Howitzer, Cal. 4.62.	Gatling Guns, Cal. .45, Long Barrel.	Gatling Gun Carriages with Limber, complete.	12-pdr. Cast Iron Guns.	9-pdr. Cast Iron Guns.	6-pdr. Cast Iron Guns.	6-pdr. Wrought Iron Gun.	4-pdr. Bronze Guns.	6-pdr. Gun Carriages.	6-pdr. Caissons.	12-pdr. Carriages.	12-pdr. Caissons.	12-pdr. Carriage for Steel Gun.	12-pdr. Field Howitzer Caisson.	12-pdr. Ship Carriage.	4 pdr. Ship Carriage.	McClellan Saddle.	Sponge and Rammers for 6-pdrs.	Sponge Heads, Rammers and Staves for 12-pdrs.	Sponge Heads, Rammers and Staves for 6-pdrs.	Sponges for 6-pdrs.	Sponges for 12-pdrs.	Sponge Bristle for 6-pdrs.	Sponge Covers for 6-pdrs.	Sponge Covers for 12-pdrs.	Rammer Heads for 6-pdrs.	Worms and Staves for 6-pdrs.	Worms and Staves for 12-pdrs.	Hand Spikes for Field Guns.	Tompions, Brass, for 6-pdrs.	Tompions, Brass, for 12-pdrs.	Tompions, Wood, for Field Guns.	Paulins.	Tar Buckets.	Gunners' Haversacks.	Gunners' Gimlets.	Thumb Stalls.	Tow Hooks.	Vent Punches.	Wrenches for Gun Carriages.	Shot Gauges.	Sights, Dispart.	Fuze Reamers.	Fuze Pouches.	Fuze Setters.	Fuze Mallets.	Lanyard.	Cannon Lock.	Eprouvette.	Spurs, pairs.	Caisson Bolts.	Halter.	Priming Wires.	Watering Buckets, Leather.
Remaining on hand November 30, 1879,	1	1	1	2	2	2	4	4	5	2	3	1	2	4	5	5	4	1	1	2	2	1	17	3	7	2	14	6	47	19	2	4	3	17	5	7	21	3	22	7	2	74	20	8	8	8	16	8	10	2	2	1	1	1	1½	6	1	..	2
Taken up,	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	......	......	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Total to be accounted for,	1	1	1	2	2	2	4	4	5	2	3	1	2	4	5	5	4	1	1	2	2	1	17	3	7	2	14	6	47	19	2	4	3	17	5	7	21	3	22	7	2	74	20	8	8	8	16	8	10	2	2	1	1	1	1½	6	1	2	2
Expended,	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	......	......	....	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	..	..	..	..	..	2	..	..	..	..	..	..	..	..
Sold,	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	......	......	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total expended and sold,	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	......	......	....	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..
Remaining on hand November 30, 1880,	1	1	1	2	2	2	4	4	5	2	3	1	2	4	5	5	4	1	1	2	2	1	17	3	7	..	12	6	47	19	2	4	3	17	5	7	21	3	22	7	2	74	20	8	8	8	16	8	10	2	2	1	1	1	1½	6	1	2	2

PROPERTY RETURN.

CLASS D. ORDNANCE AND ORDNANCE STORES—Continued.

PARTS OF SMALL ARMS AND MISCELLANEOUS IMPLEMENTS.

	For Whitney, Peabody, and Springfield Rifle Muskets.																				Miscellaneous Parts and Implements.									
	Screw Drivers.	Hammers.	Main Springs.	Sights.	Sight Screws.	Bridles.	Bridle Screws.	Tumblers.	Tumbler Screws.	Sears.	Sear Screws.	Sear Springs.	Sear Spring Screws.	Band Springs.	Bristle Wipers.	Tang Screws.	Side Screws.	Bayonet Clasps.	Bayonet Clasp Screws.	Cone Seat Screws.	Tompions, brass.	Tompions, wood.	Spare Cones, for Rifled Muskets.	Spring Vises.	Cone Picks.	Swage.	Bullet Moulds.	Sights, Springfield Rifle.	Wire and Tumbler Punches.	Rammers for Rifled Musket.
Remaining on hand November 30, 1879,	3,120	145	515	6	41	52	43	29	225	18	11	278	58	470	1,504	34	70	10	25	11	206	4,000	548	94	365	1	3	6	207	65
Received from purchase during the year,																														
Received from Connecticut National Guard,	9																													
Taken up,								50																						
Total to be accounted for,	3,129	145	515	6	41	52	43	79	225	18	11	278	58	470	1,504	34	70	10	25	11	206	4,000	548	94	365	1	3	6	207	65
Issued to Connecticut National Guard,	18														32									5					3	
Sold to officers and others,																														
Dropped,							11		25			30					5	2						4				1	5	
Total issued, dropped and sold,	18						11		25			30			32		5	2						9				1	8	
Remaining on hand November 30, 1880,	3,111	145	515	6	41	52	32	79	200	18	11	248	58	470	1,472	34	65	8	25	11	206	4,000	548	85	365	1	3	5	199	65

AMMUNITION.

	For Artillery.														For Small Arms.						
	6-pdr. Canister.	6-pdr. Canister, Hotchkiss.	6-pdr. Canister, James Rifle.	Fixed Canister for Mountain Howitzer.	12-pdr. Shell Howitzer.	12-pdr. Stand of Grape.	6-pdr. Solid Shot, Hotchkiss.	12-pdr. Conical Shot, Cal. 4.58.	6-pdr. Solid Shot, James Rifle.	Round Shot, old.	Friction Primers.	Powder, pounds.	Cartridge Bags for 6-pdr.	Cartridge Bags for 12-pdr.	Metallic Ball Cartridges, Cal. .42.	Metallic Ball Cartridges, Cal. .43.	Metallic Ball Cartridges, Cal. .45.	Metallic Blank Cartridges, Cal. .45.	Metallic Ball Cartridges, Cal. .50.	Metallic Blank Cartridges, Cal. .50.	Cartridges, Conical Ball, Cal. .58.
Remaining on hand November 30, 1879,	51	1	19	14	24	1	66	100	52	1,427		23½	10	4	23,783	1,500	5,484	1,000	7,900	2,000	20,700
Received from purchase during the year,											1,500	450					48,000	15,000			
Received from Connecticut National Guard,																	1,040				
Taken up,													500	302				2,000			
Total to be accounted for,	51	1	19	14	24	1	66	100	52	1,427	1,500	473½	510	306	23,783	1,500	54,524	18,000	7,900	2,000	20,700
Issued to Connecticut National Guard,									50		475	465	310				47,670	15,000	2,710		
Sold to officers and others,											494		138	113			2,260	50			
Dropped,															3,000						
Total issued, dropped and sold,											969	465	448	113	3,000		49,930	15,050	2,710		
Remaining on hand November 30, 1880,	51	1	19	14	24	1	66	100	2	1,427	531	8½	62	193	20,785	1,500	4,594	2,950	5,190	2,000	20,700

First Regiment, C. N. G.

Colonel Lucius A. Barbour, Hartford.

1 Springfield B. L. Rifled Musket, cal. .45.
1 Aiming Tripod.
1 Camp Desk.
1 N. C. Staff Sword.
21 Band Waist Belts and Plates.
21 Music Pouches.
22 1st Regiment Band Uniforms, complete.
4 N. C. Staff Coats.
4 N. C. Staff Pants.
4 N. C. Staff Blouses.
4 N. C. Staff Helmets.
4 N. C. Staff Fatigue Caps.
4 Infantry Overcoats.
1 Hospital Steward Chevron.
1 Fife-Major Chevron.
1 Drum-Major Chevron.
1 Quartermaster Sergeant Chevron.
1 Commissary-Sergeant Chevron.
1 Sergeant-Major Chevron.
1 Regimental Flag, State.
1 " " National.
4 Guidons.
4 Color Belts.
2 Color Waist Belts and Plates.
6 Markers.
2 Flag Covers.

Infantry Company A, Hartford, Captain William Westphal.

60 Springfield B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.

2 Screw Drivers.
63 Cartridge Boxes.
65 Bayonet Scabbards.
65 Waist Belts.
68 Waist Belt Plates.
65 Knapsacks.
1 Throg.
1 N. C. O. Sword.
1 Drum Sling.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
65 1st Regiment Coats.
65 " Pants.
65 " Blouses.
63 " Fatigue Caps.
63 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
62 Infantry Overcoats.
2 Magenta Blankets.
2 Arm Chests.
2 Overcoat Cases.
1 Case Equipment Packing.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company B, Hartford, Captain P. J. Moran.

60 Springfield B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
1 Spring Vise.
1 Iron Bench Vise.
61 Cartridge Boxes.
60 Bayonet Scabbards.
63 Waist Belts.
58 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.

63	1st Regiment Coats.
63	" Pants.
63	" Blouses.
63	" Fatigue Caps.
63	" Helmets.
1	1st Sergeant Chevron.
4	Sergeant "
8	Corporal "
63	Infantry Overcoats.
2	Magenta Blankets.
2	Overcoat Cases.
2	Arm Chests.
800	Rounds Ball Cartridges, cal. .45.

Infantry Company C, Rockville, Captain THOMAS J. RIGNEY.

64	Springfield B. L. Rifled Muskets, cal. .45.
63	" " " Musket Bayonets.
66	Cartridge Boxes.
66	Bayonet Scabbards.
65	Waist Belts.
65	Waist Belt Plates.
1	Cross Belt Plate.
62	Knapsacks.
1	Throg.
1	N. C. O. Sword.
2	Drums.
1	Drum Sling.
2	Drum Sticks, pairs.
64	1st Regiment Coats.
64	" Pants.
62	" Blouses.
58	" Fatigue Caps.
64	" Helmets.
1	1st Sergeant Chevron.
4	Sergeant "
8	Corporal "
63	Infantry Overcoats.

4 Arm Chests.
2 Overcoat Cases.
560 Rounds Ball Cartridges, cal. .45.

Infantry Company D, New Britain, Captain A. N. Bennett.

63 Springfield B. L. Rifled Muskets, cal. .45.
63 " " " Musket Bayonets.
1 Wiper, bristle.
65 Cartridge Boxes.
66 Bayonet Scabbards.
67 Waist Belts.
66 Waist Belt Plates.
65 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
3 Drum Slings.
4 Drum Sticks, pairs.
1 Drum Stick Carriage.
1 Fife.
72 1st Regiment Coats.
72 " Pants.
73 " Blouses.
64 " Fatigue Caps.
77 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
63 Infantry Overcoats.
3 Arm Chests.
2 Overcoat Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company E, New Britain, Captain Chas. B. Erichson.

74 Springfield B. L. Rifled Muskets, cal. .45.
74 " " " Musket Bayonets.

1 Screw Driver.
79 Cartridge Boxes.
76 Bayonet Scabbards.
79 Waist Belts.
79 Waist Belt Plates.
64 Knapsacks.
2 Drums.
1 Drum Cover, linen.
2 Drum Sticks, pairs.
3 Drum Slings.
64 1st Regiment Coats.
64 " Pants.
63 " Blouses.
63 " Fatigue Caps.
64 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
63 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
640 Rounds Ball Cartridges, cal. .45.

Infantry Company F, Hartford, Captain John L. White.

77 Springfield B. L. Rifled Muskets, cal. .45
77 " " " Musket Bayonets.
77 Cartridge Boxes.
78 Bayonet Scabbards.
80 Waist Belts.
77 Waist Belt Plates.
65 Knapsacks.
2 Drums.
2 Drum Slings.
2 Drum Sticks, pairs.
75 1st Regiment Coats.
75 " Pants.
75 " Blouses.

3

72 1st Regiment Fatigue Caps.
75 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
65 Infantry Overcoats.
2 Overcoat Cases.
700 Rounds Ball Cartridges, cal. .45.

Infantry Company G, South Manchester, Captain A. B. Keeney.

60 Springfield B. L. Rifled Muskets, cal. .45.
59 " " Musket Bayonets.
60 Cartridge Boxes.
57 Bayonet Scabbards.
60 Waist Belts.
57 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drum Slings.
2 Drum Sticks, pairs.
58 1st Regiment Coats.
58 " Pants.
58 " Blouses.
60 " Fatigue Caps.
66 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
58 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
1 N. C. O. Sword (old pattern).
2 Overcoat Cases.
1300 Rounds Ball Cartridges, cal. .45.

Infantry Company H, Hartford, Captain W. N. Clark.

77 Springfield B. L. Rifled Muskets, cal. .45.
76 " " " Musket Bayonets.
75 Cartridge Boxes.
77 Bayonet Scabbards.
79 Waist Belts.
79 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
79 1st Regiment Coats.
79 " Pants.
79 " Blouses.
79 " Fatigue Caps.
79 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
68 Infantry Overcoats.
1 Arm Chest.
2 Overcoat Cases.
700 Rounds Ball Cartridges, cal. .45.

Infantry Company I, Windsor Locks, Captain Joseph Reed.

56 Springfield B. L. Rifled Muskets, cal. .45.
55 " " " Musket Bayonets.
3 Screw Drivers.
3 Spring Vises.
6 Wipers, bristle.
52 Cartridge Boxes.
52 Bayonet Scabbards.
58 Waist Belts.

58 Waist Belt Plates.
56 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
56 1st Regiment Coats.
56 " Pants.
56 " Blouses.
56 " Fatigue Caps.
56 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
56 Infantry Overcoats.
3 Arm Chests.
2 Overcoat Cases.
1,300 Rounds Ball Cartridges, cal. .45.
48 Waist Belts, U. S.
48 Waist Belt Plates, U. S.
48 Bayonet Scabbards.

Infantry Company K, Hartford, Captain THOMAS M. SMITH.

77 Springfield B. L. Rifled Muskets, cal. .45.
77 " " " Musket Bayonets.
6 Tumbler Punches.
3 Spring Vises.
6 Wipers, bristle.
79 Cartridge Boxes.
79 Bayonet Scabbards.
79 Waist Belts.
79 Waist Belt Plates.
60 Cross Belt Plates.
79 Knapsacks.
2 Drums.
2 Drum Slings.

2 Drum Covers, linen.
2 Drum Sticks, pairs.
79 1st Regiment Coats.
79 " Pants.
78 " Blouses.
79 " Fatigue Caps.
79 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
78 Infantry Overcoats.
3 Arm Chests.
2 Overcoat Cases.
300 Rounds Ball Cartridges, cal. .45.

Second Regiment.

Colonel Charles P. Graham, Middletown.

1 Peabody B. L. Rifled Musket, cal. .45.
1 Aiming Tripod.
3 Waist Belts.
3 Waist Belt Plates.
1 N. C. Staff Cross Belt.
2 N. C. Staff Cross Belt Plates.
6 Knapsacks.
2 Throgs.
1 Drum.
1 N. C. O. Sword.
1 N. C. Staff Sword.
1 Camp Desk.
3 2d Regiment Coats.
3 " Pants.
3 " Blouses.
3 " Fatigue Caps.
3 " Shakos and Pompons.
3 " Epaulettes.
1 Drum-Major Chevron.
1 Quartermaster-Sergeant Chevron.

1 Commissary-Sergeant Chevron.
1 Hospital Steward "
1 Fife-Major "
15 Scarlet Blankets.
1 Regimental State Flag.
1 National "
5 Guidons.
2 Color Belts.
2 Color Waist Belts and Plates.
4 Marker Flags.

Infantry Company A, Waterbury, Captain F. A. Spencer.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Screw Drivers.
2 Wipers, bristle.
59 Cartridge Boxes.
59 Cartridge Box Belts.
59 Bayonet Scabbards.
59 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
59 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
57 2d Regiment Coats.
57 " Pants.
57 " Blouses.
60 " Fatigue Caps.
60 " Shakos and Pompons.
56 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "

8 Corporal Chevrons.
59 Scarlet Blankets.
3 Arm Chests.
2 Cases Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company B, New Haven, Captain FRANK W. TIESING.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
1 Screw Driver.
70 Cartridge Boxes.
70 Cartridge Box Belts.
70 Bayonet Scabbards.
70 Bayonet Scabbard Belts.
70 Waist Belts.
70 Waist Belt Plates.
70 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Musicians' Swords.
2 Drums.
4 Drum Slings.
4 Drum Covers, linen.
3 Drum Sticks, pairs.
2 " " Carriages.
1 Fife.
60 2d Regiment Coats.
60 " Pants.
60 " Blouses.
60 " Fatigue Caps.
60 " Shakos and Pompons.
60 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Scarlet Blankets.

3 Arm Chests.
3 Cases Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company C, New Haven, Captain MAURICE F. BRENNAN.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Screw Drivers.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
60 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
65 2d Regiment Coats.
65 " Pants.
65 " Blouses.
65 " Fatigue Caps.
65 " Shakos and Pompons.
65 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Scarlet Blankets.
3 Arm Chests.
6 Cases Equipment Packing.
2 Blanket Cases.
800 Rounds Ball Cartridges, cal. .45.

Infantry Company D, New Haven, Captain L. I. THOMAS.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Screw Drivers.
4 Wipers, bristle.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
54 Waist Belts.
48 Waist Belt Plates.
60 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
1 Drum Sticks, pair.
60 2d Regiment Coats.
60 " Pants.
60 " Blouses.
58 " Fatigue Caps.
58 " Shakos and Pompons.
60 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
59 Scarlet Blankets.
3 Arm Chests.
2 Cases Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company E, New Haven, Captain H. R. LOOMIS.

60 Peabody B. L Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.

4 Screw Drivers.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
60 Cross Belt Plates.
60 Knapsacks.
2 Throgs.
2 N. C. O. Swords.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Drum Stick Carriage.
1 Fife.
60 2d Regiment Coats.
60 " Pants.
60 " Blouses.
56 " Fatigue Caps.
60 " Shakos and Pompons.
60 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Scarlet Blankets.
3 Arm Chests.
2 Blanket Cases.
600 Rounds Ball Cartridges, cal. .45.

Infantry Company F, New Haven, Captain GEORGE S. ARNOLD.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
8 Screw Drivers.
8 Wipers, bristle.
70 Cartridge Boxes.
70 Cartridge Box Belts.

70 Bayonet Scabbards.
70 Bayonet Scabbard Belts.
70 Waist Belts.
70 Waist Belt Plates.
70 Cross Belt Plates.
60 Knapsacks.
2 N. C. O. Swords.
1 Musician's Sword.
3 Drums.
3 Drum Slings.
2 Drum Covers, linen.
3 Drum Sticks, pairs.
52 2d Regiment Coats.
52 " Pants.
52 " Blouses.
60 " Fatigue Caps.
60 " Shakos and Pompons.
52 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Scarlet Blankets.
3 Arm Chests.
2 Cases Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company G, Waterbury, Capt. CHARLES R. BANNON.

60 Peabody B. L. Rifled Muskets, cal. .45
60 " " " Musket Bayonets.
3 Screw Drivers.
1 Wiper, bristle.
2 Shell Extractors.
59 Cartridge Boxes.
59 Cartridge Box Belts.
59 Bayonet Scabbards.
59 Bayonet Scabbard Belts.
55 Waist Belts.

59 Waist Belt Plates.
59 Cross Belt Plates.
59 Knapsacks.
2 Throgs.
1 N. C. O. Sword.
2 Drums.
3 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
54 2d Regiment Coats.
54 " Pants.
54 " Blouses.
56 " Fatigue Caps.
60 " Shakos and Pompons.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
58 Scarlet Blankets.
3 Arm Chests.
1 Case Equipment Packing.
1 Blanket Case.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company H, Middletown, Captain Henry J. Bacon.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
2 Screw Drivers.
1 Wiper, bristle.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
60 Cross Belt Plates.
59 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.

2 Drum Slings.
2 Drum Covers, linen.
3 Drum Sticks, pairs.
65 2d Regiment Coats.
65 " Pants.
65 " Blouses.
65 " Fatigue Caps.
65 " Shakos and Pompons.
60 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
59 Scarlet Blankets.
3 Arm Chests.
3 Cases Equipment Packing.
2 Blanket Cases.
700 Rounds Ball Cartridges, cal. .45.

Infantry Company I, Meriden, Captain Henry B. Wood.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
5 Screw Drivers.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
60 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
62 2d Regiment Coats.
62 " Pants
62 " Blouses.

62 2d Regiment Fatigue Caps.
62 " Shakos and Pompons.
55 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Scarlet Blankets.
3 Arm Chests.
1 Case Equipment Packing.
2 Blanket Cases.
800 Rounds Ball Cartridges, cal. .45.

Infantry Company K, Wallingford, Captain WILLIAM N. MIX.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
2 Screw Drivers.
6 Wipers, bristle.
60 Cartridge Boxes.
60 Cartridge Box Belts.
58 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts.
60 Waist Belt Plates.
60 Cross Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Sticks, pairs.
60 2d Regiment Coats.
60 " Pants.
60 " Blouses.
59 " Fatigue Caps.
60 " Shakos and Pompons.
59 " Epaulettes.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "

60 Scarlet Blankets.
3 Arm Chests.
1 Case Equipment Packing.
2 Blanket Cases.
1100 Rounds Ball Cartridges, cal. .45.

Third Regiment.

Colonel William H. Tubbs, New London.

1 Peabody B. L. Rifled Musket, cal. .45.
1 Aiming Tripod.
6 Waist Belts.
6 Waist Belt Plates.
6 N. C. Staff Cross Belts.
6 N. C. Staff Cross Belt Plates.
6 N. C. Staff Swords.
1 Drum.
1 Drum Sticks, pair.
1 Bugle, Cord and Tassel.
1 Camp Desk.
26 3d Regiment Coats.
26 " Pants.
26 " Blouses.
26 " Fatigue Caps.
26 " Helmets.
21 " Epaulettes.
21 " Plumes.
26 Infantry Overcoats.
1 Quartermaster Sergeant Chevron.
1 Commissary-Sergeant Chevron.
1 Hospital Steward "
1 Fife-Major "
1 Sergeant-Major "
1 Regimental Flag, State
1 " " National.
4 Guidons.
2 Color Belts.

2 Color Waist Belts and Plates.
4 Marker Flags.
20 Music Pouches.
20 Band Waist Belts and Plates.
1 Overcoat Case .
480 Rounds Ball Cartridges, cal. .45.

Infantry Company A, Mystic, Captain John H. Hoxie.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
8 Tumbler Punches.
2 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
59 Waist Belts.
58 Waist Belt Plates.
59 Knapsacks.
1 N. C. O. Sword.
3 Drums.
3 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
60 3d Regiment Coats.
60 " Pants.
60 " Blouses.
60 " Fatigue Caps.
60 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
55 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
660 Rounds Ball Cartridges, cal. .45.

Infantry Company B, Pawcatuck, Captain Michael Twomey.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.

9 Tumbler Punches.
11 Screw Drivers.
3 Spring Vises.
59 Cartridge Boxes.
59 Bayonet Scabbards.
59 Waist Belts.
58 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
58 3d Regiment Coats.
58 " Pants.
58 " Blouses.
55 " Fatigue Caps.
56 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
56 Infantry Overcoats.
4 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
1380 Rounds Ball Cartridges, cal. .45.

Infantry Company C, Norwich, Captain JAMES J. McCORD.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
3 Tumbler Punches.
2 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
58 Waist Belts.
51 Waist Belt Plates.
60 Knapsacks.

1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
1 Drum Cover, linen.
2 Drum Sticks, pairs.
1 Fife.
52 3d Regiment Coats.
52 " Pants.
52 " Blouses.
55 " Fatigue Caps.
55 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
52 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
420 Rounds Ball Cartridges, cal. .45.

Infantry Company D, New London, Capt. WILLIAM H. BENTLEY.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " Musket Bayonets.
23 Screw Drivers.
6 Tumbler Punches.
3 Spring Vises.
63 Cartridge Boxes.
63 Bayonet Scabbards.
59 Waist Belts.
50 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
3 Drums.
2 Drum Slings.
3 Drum Sticks, pairs.

1 Fife.
49 3d Regiment Coats.
49 " Pants.
47 " Blouses.
49 " Fatigue Caps.
51 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
52 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company E, Willimantic, Capt. Herbert R. Chappell.

70 Peabody B. L. Rifled Muskets, cal. .45.
70 " " " Musket Bayonets.
9 Tumbler Punches.
3 Spring Vises.
6 Wipers, bristle.
70 Cartridge Boxes.
70 Bayonet Scabbards.
70 Waist Belts.
68 Waist Belt Plates.
70 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
65 3d Regiment Coats.
65 " Pants.
65 " Blouses.
65 " Fatigue Caps.
65 " Helmets.
1 1st Sergeant Chevron.

4 Sergeant Chevrons.
8 Corporal "
63 Infantry Overcoats.
4 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
580 Rounds Ball Cartridges, cal. .45.

Infantry Company G, Putnam, Captain Otis Fisher.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
5 Tumbler Punches.
2 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
1 Drum Cover, linen.
2 Drum Sticks, pairs.
1 Fife.
62 3d Regiment Coats.
62 " Pants.
62 " Blouses.
62 " Fatigue Caps.
62 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
58 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
480 Rounds Ball Cartridges, cal. .45.

Infantry Company H, Danielsonville, Capt. SETH C. SPAULDING.

59 Peabody B. L. Rifled Muskets, cal. .45.
59 " " " Musket Bayonets.
7 Tumbler Punches.
3 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
52 Waist Belt Plates.
59 Knapsacks.
2 Drums.
3 Drum Slings.
2 Drum Sticks, pairs.
64 3d Regiment Coats.
64 " Pants.
63 " Blouses.
64 " Fatigue Caps.
65 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
63 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
380 Rounds Ball Cartridges, cal. .45.

Infantry Company I, New London, Captain A. N. STERRY.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
58 Knapsacks.
2 Drums.
2 Drum Slings.

2 Drum Covers, linen.
2 Drum Sticks, pairs.
63 3d Regiment Coats.
63 " Pants.
63 " Blouses.
62 " Fatigue Caps.
62 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
58 Infantry Overcoats.
3 Arm Chests.
2 Cases Equipment Packing.
2 Overcoat Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company K, Willimantic, Captain MYRON P. SQUIRES.

55 Peabody B. L. Rifled Muskets, cal. .45.
55 " " " Musket Bayonets.
6 Screw Drivers.
3 Tumbler Punches.
3 Spring Vises.
6 Wipers, bristle.
55 Cartridge Boxes.
55 Bayonet Scabbards.
57 Waist Belts.
57 Waist Belt Plates.
58 Knapsacks.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
56 3d Regiment Coats.
56 " Pants.
56 " Blouses.
56 " Fatigue Caps.
56 " Helmets.

1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
56 Infantry Overcoats.
3 Arm Chests.
1 Case Equipment Packing.
2 Overcoat Cases.
1300 Rounds Ball Cartridges, cal. 45.

Fourth Regiment.

Colonel George S. Crofut, Bethel.

1 Peabody B. L. Rifled Musket, cal. .45.
6 Waist Belts.
6 Waist Belt Plates.
6 N. C. Staff Swords, new pattern.
3 Infantry Bugles, Cord and Tassels.
1 Aiming Tripod.
1 Camp Desk.
1 Drum.
1 Drum Sling.
1 Drum Sticks, pair.
25 4th Regiment Coats.
25 " Pants.
5 " Blouses.
26 " Fatigue Caps.
25 " Helmets.
1 Quartermaster Sergeant Chevron.
1 Commissary-Sergeant Chevron.
1 Hospital Steward "
1 Sergeant-Major "
1 Fife-Major "
20 Music Pouches.
20 Band Waist Belts and Plates.
1 Regimental State Flag.
1 National "

2 Guidons.
4 Marker Flags.
2 Color Belts.
2 Color Waist Belts and Plates.

Infantry Company A, *Bethel*, Captain FREDERICK COLE.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Wipers, bristle.
6 Screw Drivers.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
60 Knapsacks.
1 N. C. O. Sword.
2 Drums.
3 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
61 4th Regiment Coats.
61 " Pants.
61 " Blouses.
59 " Fatigue Caps.
60 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Blue Blankets.
3 Arm Chests.
3 Cases Equipment Packing.
1 Blanket Case.
600 Rounds Ball Cartridges, cal. .45.

Infantry Company B, *Bridgeport*, Captain GEORGE W. CORNELL.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.

6 Screw Drivers.
60 Cartridge Boxes.
60 Bayonet Scabbards.
62 Waist Belts.
63 Waist Belt Plates.
62 Knapsacks.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
62 4th Regiment Coats.
62 " Pants.
62 " Blouses.
62 " Fatigue Caps.
62 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
62 Blue Blankets.
3 Arm Chests.
4 Cases Equipment Packing.
2 Blanket Cases.
1800 Rounds Ball Cartridges, cal. .45.

Infantry Company C, Stamford, Capt. WILLIAM W. STUDWELL.

60 Peabody B. L. Rifled Muskets, cal. .45.
58 " " " Musket Bayonets.
1 Screw Driver.
6 Wipers, bristle.
60 Cartridge Boxes.
60 Bayonet Scabbards.
51 Waist Belts.
53 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.

2 Drum Slings.
1 Drum Cover, linen.
60 4th Regiment Coats.
60 " Pants.
60 " Blouses.
59 " Fatigue Caps.
60 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
56 Blue Blankets.
3 Arm Chests.
2 Blanket Cases.
1000 Rounds Ball Cartridges, cal. .45.

Infantry Company D, South Norwalk, Captain E. F. JENNINGS.

70 Peabody B. L. Rifled Muskets, cal. .45.
70 " " " Musket Bayonets.
1 " " " Musket Bayonet, cal. .43.
4 Wipers, bristle.
70 Cartridge Boxes.
70 Bayonet Scabbards.
66 Waist Belts.
68 Waist Belt Plates.
70 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Fife.
70 4th Regiment Coats.
70 " Pants.
70 " Blouses.
70 " Fatigue Caps.
70 " Helmets.

1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
70 Blue Blankets.
4 Arm Chests.
2 Blanket Cases.
1 Case Equipment Packing.
480 Rounds Ball Cartridges, cal. .45.

Infantry Company E, Bridgeport, Captain EDWIN N. GOODWIN.

70 Peabody B. L. Rifled Muskets, cal. .45.
70 " " " Musket Bayonets.
6 Screw Drivers.
10 Wipers, bristle.
70 Cartridge Boxes.
70 Bayonet Scabbards.
72 Waist Belts.
72 Waist Belt Plates.
73 Knapsacks.
3 Throgs.
1 N. C. O. Sword.
2 Drums.
3 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Fife.
72 4th Regiment Coats.
72 " Pants.
72 " Blouses.
75 " Fatigue Caps.
75 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
73 Blue Blankets.
4 Arm Chests.
3 Cases Equipment Packing.
2 Blanket Cases.
400 Rounds Ball Cartridges, cal. .45.

Infantry Company F, Norwalk, Captain ADDISON A. BETTS.

50 Peabody B. L. Rifled Muskets, cal. .45.
50 " " Musket Bayonets.
6 Screw Drivers.
6 Wipers, bristle.
50 Cartridge Boxes.
50 Bayonet Scabbards.
50 Waist Belts.
50 Waist Belt Plates.
50 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
50 4th Regiment Coats.
50 " Pants.
50 " Blouses.
50 " Fatigue Caps.
50 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
50 Blue Blankets.
3 Arm Chests.
4 Cases Equipment Packing.
2 Blanket Cases.
560 Rounds Ball Cartridges, cal. .45.

Infantry Company G, Danbury, Captain GEORGE C. COMES.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
5 Screw Drivers.
2 Wipers, bristle.
59 Cartridge Boxes.

58 Bayonet Scabbards.
59 Waist Belts.
55 Waist Belt Plates.
55 Knapsacks.
2 Drums.
2 Drum Slings.
1 Drum Cover, linen.
56 4th Regiment Coats.
55 " Pants.
50 " Blouses.
52 " Fatigue Caps.
55 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
55 Blue Blankets.
3 Arm Chests.
2 Cases Equipment Packing.
2 Blanket Cases.
1300 Rounds Ball Cartridges, cal. .45.

Infantry Company H, Litchfield, Capt. ALEXANDER B. SHUMWAY.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Screw Drivers.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
60 Knapsacks.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Fife.
53 4th Regiment Coats.
53 " Pants.

53 4th Regiment Blouses.
52 " Fatigue Caps.
54 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Blue Blankets.
4 Arm Chests.
1 Case Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

Infantry Company I, Winsted, Captain JOHN H. SLOCUM.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
7 Tumbler Punches.
3 Spring Vises.
8 Wipers, bristle.
70 Cartridge Boxes.
69 Bayonet Scabbards.
69 Waist Belts.
69 Waist Belt Plates.
1 Cross Belt Plate.
62 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Fife.
64 4th Regiment Coats.
64 " Pants.
64 " Blouses.
63 " Fatigue Caps.
63 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "

61 Blue Blankets.
3 Arm Chests.
1 Case Equipment Packing.
2 Blanket Cases.
1420 Rounds Ball Cartridges, cal. .45.

Infantry Company K, Stratford, Captain H. M. BLAKESLEE.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
6 Screw Drivers.
6 Wipers, bristle.
60 Cartridge Boxes.
60 Bayonet Scabbards.
62 Waist Belts.
62 Waist Belt Plates.
60 Knapsacks.
1 Throg.
1 N. C. O. Sword.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
1 Fife.
66 4th Regiment Coats.
66 " Pants.
66 " Blouses.
60 " Fatigue Caps.
65 " Helmets.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
60 Blue Blankets.
4 Arm Chests.
2 Cases Equipment Packing.
2 Blanket Cases.
300 Rounds Ball Cartridges, cal. .45.

First Platoon Light Artillery, Guilford, Lieut. WILLIAM H. LEE.

2 6-pounder Rifled Bronze Guns, cal. 3.80.
2 " Gun Carriages, complete.
2 " Gun Caissons.
4 Double Set Wheel Artillery Harness.
4 Double Set Lead Artillery Harness.
2 6-pounder Brass Tompions, Willmot's Patent.
4 6-pounder Sponges and Rammers.
4 6 pounder Sponge Covers.
3 Watering Buckets, Gutta Percha.
2 Tar Buckets.
2 Fuze Pouches.
1 " Reamer.
1 " Gouge.
4 Gunner's Haversacks.
2 " Pincers.
1 " Gimlet.
1 " Shears.
2 Vent Punches.
2 Tow Hooks.
2 Thumbstalls.
2 Lanyards.
2 Priming Wires.
4 Handspikes
2 Paulins, large.
2 Prolonges.
40 Colt's Army Pistols, cal. .45.
33 Screw Drivers.
40 Pistol Holsters.
1 Set Sights for 6-pounder Gun.
37 Artillery Sabres.
33 Artillery Sabre Belts and Plates.
5 McClellan Saddles with Equipments.
1 Skirmishing Bugle.
1 " " Cord and Tassel.
1 Battery Guidon.
7 Cases Packing.

40 Artillery Coats.
48 " Pants.
40 " Blouses.
40 " Helmets.
38 " Plumes.
40 " Fatigue Caps.
38 Overcoats.
1 1st Sergeant Chevron.
2 Sergeant "
5 Corporal "
7 Artillery Jackets.
16 Artillery Blankets.
7 Artillery Whips.
8 Pairs Spurs.
34 6-pounder Blank Cartridges.
8 Curry Combs.
8 Brushes.
65 Friction Primers.
157 Metallic Ball Cartridges, cal. .45.
50 Solid Shot for 6-pounder.
1 Overcoat Case.

Second Platoon Light Artillery, *Clinton*, Lieutenant H. HUBBARD KELSEY.

2 6-pounder Rifle Bronze Guns, cal. 3.80.
2 " Carriages, complete.
2 " Caissons.
4 " Sponges and Rammers.
3 " Sponge Covers.
2 " Worms and Staves.
4 Handspikes.
2 Prolonges.
2 Sponge Buckets.
3 Watering " Gutta Percha.
4 Gunner's Haversacks.
2 Fuze Pouches.
2 " Reamers.
2 Thumb Stalls.

2 Tow Hooks.
2 Priming Wires.
2 Lanyards.
2 Gunner's Gimlets.
2 " Shears.
2 Tar Buckets.
2 Paulins.
2 6-pounder Tompions, brass.
4 Double Sets Wheel Artillery Harness.
4 " " Lead Artillery Harness.
7 McClellan Saddles, complete.
16 Artillery Blankets.
5 Spurs, Pairs.
8 Curry Combs.
8 Brushes.
35 Artillery Sabres.
34 " " Belts and Plates.
7 Cases Equipment Packing.
1 Gunner's Pincers.
1 Battery Guidon.
1 Skirmishing Bugle, Cord and Tassel.
35 Artillery Coats.
35 " Pants.
35 " Blouses.
40 " Helmets.
40 " Fatigue Caps.
40 " Plumes.
35 Overcoats.
1 1st Sergeant Chevron.
2 Sergeant "
5 Corporal "
1 Overcoat Case.

Fifth Battalion.

Major W. H. Layne, Jr., New Haven.

3 Waist Belts.
3 Waist Belt Plates.
1 Color Belt.

3 N. C. Staff Cross Belts.
3 N. C. Staff Cross Belt Plates.
3 N. C. Staff Swords.
1 Drum.
1 Drum Cover, linen.
1 Drum Sticks, pair.
3 Infantry Coats.
3 " Pants.
3 " Blouses.
3 " Caps.
3 Pompons.
3 Shakos.
210 Rounds Ball Cartridges, cal. .50.
1 Silk U. S. Color.
1 " State Color.
2 " Markers.
2 " Guidons.
1 Quartermaster-Sergeant Chevron.
1 Sergeant-Major "
1 Drum-Major "

Infantry Company A, Fifth Battalion, New Haven, Captain THOMAS J. GRIFFIN.

60 Springfield B. L. Rifled Muskets, cal. .50.
60 " " " Musket Bayonets.
6 Screw Drivers.
6 Tumbler Punches.
3 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
62 Infantry Coats.
62 " Pants.

62 Infantry Blouses.
61 " Fatigue Caps.
62 Shakos.
62 Pompons.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
3 Arm Chests.
1 Case Equipment Packing.
600 Rounds Ball Cartridges, cal. .50.

Infantry Company B, Fifth Battalion, Hartford, Captain LLOYD G. SEYMOUR.

60 Springfield B. L. Rifled Muskets, cal. .50.
59 " " " Musket Bayonets.
6 Screw Drivers.
2 Tumbler Punches.
2 Spring Vises.
6 Wipers, bristle.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
62 Infantry Coats.
62 " Pants.
62 " Blouses.
61 " Fatigue Caps.
62 Shakos.
62 Pompons.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
3 Arm Chests.
1 Case Equipment Packing.
420 Rounds Ball Cartridges, cal. .50.

Infantry Company C, Fifth Battalion, Bridgeport, Captain FRANK M. WELCH.

60 Springfield B. L. Rifled Muskets, cal. .50.
60 " " " Musket Bayonets.
5 Screw Drivers.
5 Tumbler Punches.
2 Spring Vises.
60 Cartridge Boxes.
60 Bayonet Scabbards.
60 Waist Belts.
60 Waist Belt Plates.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
61 Infantry Coats.
61 " Pants.
61 " Blouses.
60 " Fatigue Caps.
61 Shakos.
61 Pompons.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
3 Arm Chests.
1 Case Equipment Packing.
300 Rounds Ball Cartridges, cal. .50.

Infantry Company D, Fifth Battalion, Norwich, Captain JOHN W. WILLIAMS.

60 Springfield B. L. Rifled Muskets, cal. .45.
60 " " " Musket Bayonets.
3 Screw Drivers.
2 Tumbler Punches.
3 Spring Vises.
60 Cartridge Boxes.

60 Bayonet Scabbards.
59 Waist Belts.
59 Waist Belt Plates.
2 Drums.
2 Drum Slings.
2 Drum Covers, linen.
2 Drum Sticks, pairs.
53 Infantry Coats.
53 " Pants.
53 " Blouses.
52 " Fatigue Caps.
52 Shakos.
52 Pompons.
1 1st Sergeant Chevron.
4 Sergeant "
8 Corporal "
3 Arm Chests.
360 Rounds Ball Cartridges, cal. .45.

First Company Governor's Horse Guards, Hartford, Major CHAUNCEY B. BOARDMAN.

69 Artillery Sabres
67 Pistols.
2 Pistol Cases, packing.
79 Saddles.
67 Saddle Cloths.
7 Cases Equipment Packing.
70 Black Enamelled Waist Belts.
70 Waist Belt Plates.

Second Company Governor's Horse Guards, New Haven, Major CHARLES W. BLAKESLEE, Jr.

75 Whitney Navy Pistols.
75 Artillery Sabres.
1 Sabre Belt and Plate.
75 Cavalry Cartridge Boxes.

75 Cavalry Cartridge Box Plates.
75 Saddles.
75 Bridles.
75 Collars.
75 Saddle Cloths.
73 Ball Moulds.
69 Cone Wrenches.
6 Uniforms.
1 Pistol Packing Case.
12 Cases Equipment Packing.
75 Black Enamelled Waist Belts.
75 Waist Belt Plates.

First Company Governor's Foot Guards, Hartford, Major GEORGE B. FISHER.

112 Springfield B. L. Rifled Muskets, cal. .45.
112 " " " Musket Bayonets.
4 Drums.
1 Drum Sling.
3 Drum Sticks, pairs.
3 Drum Covers.
1 Silk State Color.
100 Infantry Overcoats.
3 Overcoat Cases.
500 Metallic Ball Cartridges, cal. .45.

Second Company Governor's Foot Guards, New Haven, Captain E. S. MORSE.

60 Peabody B. L. Rifled Muskets, cal. .45.
60 " " Musket Bayonets.
60 Cartridge Boxes.
60 Cartridge Box Belts.
60 Bayonet Scabbards.
60 Bayonet Scabbard Belts.
60 Waist Belts
60 Waist Belt Plates.
60 Cross Belt Plates.

1 Throg.
69 Infantry Coats.
69 " Pants.
69 " Caps.
69 Shakos.
69 Pompons.
69 Epaulettes, pairs.
680 Metallic Ball Cartridges, cal. .45.

Putnam Phalanx, Hartford, Major FREEMAN M. BROWN.

100 Cadet Muskets.
100 " Musket Bayonets.

WM. H. RUSSELL, *Collegiate and Commercial Institute, New Haven.*

107 Cadet Muskets.
107 Musket Bayonets.
150 Cavalry Cartridge Boxes.
150 " " Box Plates.
150 Cap Pouches and Picks.
150 Cross Belt Plates.
2 6-pounder Smooth Bronze Guns, cal. 3.80.
2 " Gun Carriages, complete.
2 " Gun Caissons.
2 " Brass Tompions, Willmot's Patent.
2 " Sponges and Rammers.
2 Worms and Staves.
4 Handspikes.
2 Sponge Buckets.
2 Tar Buckets.
4 Watering Buckets, leather.
2 Prolonges.
4 Gunner's Haversacks.
2 " Gimlets.
4 Fuze Pouches.
2 Tow Hooks.
4 Thumbstalls.
2 Priming Wires.

2 Lanyards.
2 Paulins, small.
3 Arm Chests.
6 Cases Equipment Packing.

EMORY F. STRONG, *Bridgeport Military School, Bridgeport.*

40 Cadet Muskets.
40 Cadet Musket Bayonets.
40 Wood Tompions.
40 Spare Cones.
26 Wipers.
40 Cone Wrenches.
4 Ball Screws.
4 Tumbler Punches.
4 Spring Vises.
40 Bayonet Scabbards.
40 Cap Pouches.
2 Arm Chests.

A. S. JARVIS, *Weston Military Institute, Weston.*

75 Cadet Muskets.
75 Cadet Musket Bayonets.
4 Arm Chests.

City of New Haven.

2 6-pounder Rifled Bronze Guns, cal. 3.80.
2 " Gun Carriages, complete.
2 " Tompions, wood.
4 " Sponges and Rammers.
4 " Sponge Covers.
1 Worm and Stave.
6 Handspikes.
2 Prolonges.
5 Watering Buckets.

4 Gunner's Haversacks.
2 " Gimlets.
4 Fuze Pouches.
6 Tow Hooks.
2 Priming Wires.
4 Lanyards.
2 Felling Axes.
2 Caisson Shovels.
1 Pick Axe and Handle.
2 Fuze Gouges.
2 Paulins.
100 Rounds Ammunition.

Delany Guards, *New Haven*, Captain CHARLES E. BOLLES.

1 Cartridge Box and Plate.
2 Waist Belts.
1 Waist Belt Plate.
1 Cross Belt Plate.
1 Tumbler Punch.
1 Spare Cone.
10 Cone Wrenches.
15 Wipers.
2 Ball Screws.

Emmet Guard, *New Haven*, Captain WILLIAM COSTIGAN.

50 Springfield B. L. Rifled Muskets, cal. .58.
50 " " " Musket Bayonets.
6 Tumbler Punches.
6 Cone Wrenches.
6 Spring Vises.
3 Arm Chests.

Merriam Post, *No.* 8, *G. A. R.*, *West Meriden*, ISAAC B. HYATT.

25 Springfield M. L. Rifled Muskets, cal. .58.
25 " " " Musket Bayonets.

1 Arm Chest.
1 Case Equipment Packing.

Wadham Post, No. 49, *G. A. R., Waterbury,* GEORGE ROBBINS.

12 Springfield M. L. Rifled Muskets, cal. .58.
12 " " " Musket Bayonets.
1 Arm Chest.


PLAN OF THE
CITY OF HARTFORD
Showing
SEWERS
Scale of feet.
Compiled and drawn by
Chas. L. Burdett, Civil Engr.
1880
Notes
Sewers in Park River District are shown by solid lines
North East broken
Franklin Ave. broken
discharging into Conn. River are shown by dotted lines
Figures in River are soundings below ordinary water level
underlined show heights of sewers above City Base
Other figures show heights of surface above
and size of sewers
WETHERSFIELD COVE.
CONNECTICUT RIVER.
CONNECTICUT RIVER.
PARK RIVER
NORTH BRANCH

THIRD ANNUAL REPORT

OF THE

State Board of Health,

FOR THE

FISCAL YEAR ENDING NOVEMBER 30, 1880.

Printed by Order of the Legislature.

HARTFORD, CONN.:
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1880.

State of Connecticut.

Office of the State Board of Health,
State House, Hartford, Dec., 1880.

To His Excellency, H. B. Bigelow, *Governor of the State of Connecticut.*

Sir: In compliance with the laws of this State, I have the honor to present to you the accompanying report of the State Board of Health for the fiscal year ending Nov. 30, 1880.

Very respectfully,

C. W. CHAMBERLAIN, M.D.,
Secretary State Board of Health.

MEMBERS OF THE BOARD.

	Term expires.
John S. Butler, M.D., President, Hartford,	July, 1886
Hon. A. C. Lippitt, New London,	" 1886
Prof. C. A. Lindsley, M.D., New Haven,	" 1884
Prof. W. H. Brewer, New Haven,	" 1884
Hon. A. E. Burr, Hartford,	" 1882
Robert Hubbard, M.D., Bridgeport,	" 1882
C. W. Chamberlain, M.D., Hartford, Secretary.	

GENERAL REPORT.

The sanitary history of the past year, unlike its immediate predecessors, has not been marked by impressive and striking events that force upon the attention of the most heedless and thoughtless, even, some idea of the value and power of public hygiene, its pre-eminent importance, and indeed vital necessity, as well as the disastrous results that follow neglect or disregard of sanitary laws. There has, however, been a steady and lasting improvement; the lessons of the recent epidemic of the South have not yet been forgotten, while much clearer and more intelligent ideas of sanitation in general have become diffused among the people, as shown in the manner local epidemics and individual cases of many zymotic diseases are discussed and acted upon. In many instances the first question asked is, What is the cause; and it is singular what queer unsanitary conditions are found which have been overlooked or forgotten; for example, under the very bed of a patient that had died from erysipelas, following a comparatively slight injury, the open mouth of a waste-pipe was discovered. The room was on the third floor, and when the house was constructed it was the plan to have placed a basin here; the waste-pipe was therefore carried up, left open at the level of the floor, and forgotten. As there were basins on each floor beneath, and only a large trap in the cellar, a moment's reflection will show that this opening, the highest in the system of waste-pipes in the house, ventilated them all, while oftentimes the communication with the sewer was direct, such a trap furnishing an unsatisfactory and inconstant protection. A few feet more of waste-pipe would have brought it directly beneath his nose; it was near enough, however. This improved public sentiment has been marked in this State; individuals and health authorities have in many cases successfully contended with the sanitary problems brought thus directly to their notice.

There have also several States created State Boards of Health since our last report, as New York, North Carolina, and Iowa; and others

have reorganized those already existing, conferring new powers. There are still many among us who see the causes of disease, in some mysterious condition of the atmosphere for instance, beyond man's knowledge or control, so perchance they breathe in the floating excrementitious particle sun and wind have set in motion, and chancing upon the typhoid variety, succumb to this form of disease. The atmospheric theory, indeed, should have due consideration; such mysterious conditions have in times past devastated large areas through Asiatic cholera. Or a diphtheritic germ thus floating, its life and vigor maintained by the filth-polluted air, finds lodgment in his throat, or enters the blood by way of the lungs, and the malignant disease, strange to say, follows after. But being mercifully protected from such evils, he slakes his thirst, while on his way, at a well, not noticing the cess-pool and privy-vault on the adjacent bank above, and the fell typhoid reaches him thus at last. There is nothing mysterious about this: the causes are plain enough. The inference must not be drawn that filth is the sole cause of disease, or that all dirt is filth in a sanitary sense. By filth is meant organic substances in process of putrefactive decay, and the germs or virus of disease, whichever it may be. Many of the products of decay are apparently pure, thus excrement-polluted water may be as clear and sparkling as you please; indeed, the gases and chemical salts impart quite a pleasant taste and exhilarating sparkle, and the water from wells thus polluted is often sought far and near for drinking purposes. Neither is it strange, while we are upon this vein, that women shut up in ill-ventilated rooms, sleeping at night often with several children in one small room, kept close for warmth's sake, and others pursuing sedentary occupations, breathing polluted air, or rather re-breathing the same air repeatedly, or drinking contaminated water, should at length develop pulmonary consumption, or fall a ready victim to the first acute attack of disease or exposure to contagion, or worse yet, drag out miserable lives, broken in health and vigor.

The personal element in the equation must not be overlooked; oftentimes exposure to contagion the most direct, as rooming with malignant scarlet fever or confluent small pox, results in no harm; not every blossom produces fruit, nor every seed a plant; this truth extends to the germs of disease. In this report the germ theory and its terms will be freely used; it is, however, tentatively held subject to revision; the terms are generally pretty commonly used

and familiar, and germ is a much more pleasant term to use than a granular particulate aggregation, or the like. That diseases are conveyed through organic agencies is pretty generally believed; the yeast theory is exploded, although the terms zymotic and the like are retained, as illustrating a general idea, although the exact interpretation no longer is accepted. The germ theory is not yet proven, and while doubtless true in many points, requires further study and proof before it ranks among accepted facts. It is not intended to discredit the theory, but simply to explain its status.

An encouraging sign of the rapid development of a healthier sentiment upon all these topics is afforded by the attitude of the clergy and religious press, the results of direct violation of the plainest hygienic laws are not charged upon the Creator, and it is questioned whether it is an exemplification of Christian principles to crowd tenants into death-traps, cheaply constructed by omitting all hygienic protection. The sanitary inspector, as well as the schoolmaster, is abroad, and the results are manifest. The attention paid to sanitary laws, in arranging for the new High School at Bridgeport, is another illustration of progress where, indeed, the whole question of deciding upon the plans submitted depended upon the question of affording a plentiful supply of pure air without the exposure in cold weather that results from recourse to doors and windows to secure it, as is generally, alas, the case, rushing into greater danger to escape one set of evils. The cold blast upon heated frames "slays like a sword"; the lungs, weakened by the vitiated air supplied to them are easily congested, and sickness and death completes the series. The instructions to tenants issued by the Norwich Savings Bank, and their regard to sanitary construction, is another indication. Indeed, these might be multiplied almost indefinitely.

PREVALENT DISEASES.

There have been more epidemics by far than last year, although the mortality in many of them cannot be said to have been excessive. The disease that has been most universally diffused is the measles, and in few instances has the whole mass of the children been so generally affected as in this. It seemed that scarcely any escaped. Having previously had the disease did not satisfy its demands in all cases, and even a third seizure is mentioned where the victim had been twice afflicted. The disease appeared first in the southwestern part of the State, or was thence first reported.

Six deaths in New Haven in the previous December mark its appearance there. It spread with considerable rapidity. A death was reported in Hartford in February last. The latest deaths were reported in June from Waterbury. In many of the smaller towns the disease continued later, although unreported. The mortality is not large, the usual complications causing the greater part, rather than the disease directly. The form of Rothëln, or German measles, as it is often called, was also reported occasionally. The remarks of Dr. Lindsley upon the spread of the disease and the desirability of closing schools in general epidemics, or restraining attendance by inspection, are as follows:

"The rapid spread of the disease is, I believe, largely chargeable to the intercourse of the children in the public schools. There are also more cases of whooping cough than common (New Haven), and this disorder is assuming the character of an epidemic. Although the Board of Education have regulations intended to prevent the spread of contagious diseases in the public schools, I have been informed by authority that they have not been vigilantly enforced respecting either measles or whooping cough. It is assumed to be the inevitable fate of all children to be afflicted with these disorders, and therefore it is of no sort of importance to observe any precautions to prevent them. Several fatal results may be attributed to this theory, and it is sure to be productive of many more if continued. Measles and whooping cough are not trifling ailments; they are often malignant and deadly. Of the sixteen deaths by zymotic diseases in New Haven during the month of February, six were caused by measles, four by whooping cough. It is not true that every child will have these diseases. A large number escape and many more would if proper precautions were taken. But then if it were true, there is a good and a bad time to have them, and I can scarcely think of an act of more perilous imprudence than to introduce into a schoolroom of fifty children these dangerous diseases, when there is almost sure to be among the fifty some whose impaired health at the time makes it emphatically a bad time to take these disorders. Children that under favorable circumstances will pass through them with complete safety will under unfavorable circumstances as often perish, or if they survive the immediate attack will have their health more or less permanently broken in consequence."

Many authorities coincide with these views, notably Dr. Raymond, Sanitary Superintendent of Brooklyn, N. Y., who has published a pamphlet on the epidemic in that city, in which he contends that measles is not a trivial disease, and thus concludes:

"Measles, now (May) epidemic in Brooklyn, has already caused seventy-three deaths, is one of the most virulently contagious dis-

eases. Its contagiousness, developed at a very early stage, is conveyed by families, where a case exists from the clothes of those lately in attendance upon a case (F. White), from boxes sent home from schools where measles have prevailed, one cannot remain in the same room, or even house, without danger of taking the disease. *One attack does not protect.* In view of these facts the Board of Health directs the exclusion from the schools of all children living in houses where measles exist, and forbids their return until the case is well and the premises are fumigated with sulphur."

The most dangerous complications, as has been stated, are those relating to the lungs, and the disease is often followed by consumption thus developed, especially when there is a tendency inherited to consumption. We would advise that the greatest care should be exercised in guarding such children from exposure to the disease; also where acute lung affections already exist. The dangers of taking cold after measles are too little guarded against, and too often health is ruined from carelessness here. Scarlet fever has been locally epidemic in but one or two instances and not very malignant. Whooping cough has been an unusually prevalent epidemic in many places, but not unusually severe or fatal. The susceptibility to mumps appears to have been nearly exhausted last year. Influenza and catarrhal affections have been more or less prevalent during the spring, and have become epidemic occasionally in different localities. Cholera infantum has not been as prevalent as usual in several localities. Diphtheria in general about as usual. This disease has been locally epidemic in several places and of malignant type. A discussion of its manifestations will be found later, as also of

MALARIAL DISEASES,

several new forms of which have been reported, malarial bronchitis or broncho-pneumonia, malarial cystitis, and enteric varieties, congestive chills are increasing in frequency. While the invasion of new territory has not been rapid, the frequency in its former seats has often very notably increased. Cerebro-spinal meningitis has not much increased. It must now be considered endemic.

Pneumonia, bronchitis, and pleurisy have been unusually prevalent, and continuing even into the summer months. Typhoid fever and diarrheal diseases have been epidemic locally in several instances, and are discussed later. The nearest approach to a general epidemic was in the case of measles; a mild type of influenza comes next.

In general the health of the State has been not as good as during the two preceding years. Still there has been no alarming increase in the general mortality.

SMALL POX.

Small pox reappears in the mortality lists for the first time since 1876, although there have of course been cases meanwhile in different parts of the State, and perhaps a few deaths, but they have escaped record. The deaths occurred in a localized epidemic in December, 1879, and January, 1880, since our last report. It broke out among a colony of Portuguese, many of whom were sailors. It was of course imported, and from their negligence and the vile sanitary conditions of their quarters it acquired considerable headway, and a dangerous epidemic was threatened, but suppressed by the active and intelligent efforts of the Mayor and his coadjutors. Unfortunately there was no pest house, which added to the difficulties of isolation, so that it is not strange that there were some cases in other parts of the city. We were consulted in regard to the need for a pest house—how it should be constructed and regulated. Instructions concerning disinfection were furnished, as comprised in the directions of the National Board of Health, reprinted in our last report. As the Legislature was in session assistance was also afforded in securing additional powers not heretofore provided in the city charter, to meet this and future similar exigencies. These instructions were now issued for general distribution in similar cases.

FILTRATION OF POTABLE WATER.

The filtration of river water, or the purification of water used for the general supply of towns or cities, has several times been brought before us during the year. The experience of continental cities of London, and many cities and towns in our own country, has fully determined the question that impurities held in *suspension* in the water thus used can be almost if not entirely removed by suspension and filtration-beds properly constructed. Where much earthy matter is carried along by the river currents, as finely-divided clay, in the rivers of the southwest especially, or where the stream flows for a great portion of its course through cultivated fields, and thus acquires a larger proportion of earthy and organic vegetable debris. A reservoir where these suspended matters

may gradually settle to the bottom is fully as important as the filtration itself. To complete this process to any degree of perfection would however require weeks, and often months, but it is of the greatest assistance to the filtration, even when partially accomplished, as quantities of earthy and other substances that render the water turbid settle, while the water remains quiet in these subsidence-reservoirs, and so do not clog the filters. There is still, in the discussion of the whole question of impurities in water a great deal of confusion between *suspended* matters and those in *solution.* Of course every one comprehends the illustration that sugar, for instance, is dissolved in water, and clay suspended in a finely-divided state, and that while the water in which large quantities of pure sugar is dissolved remains clear and bright, it is not in one sense pure water, that is, it has a foreign substance dissolved in it, held in solution, that this water will dissolve salt and still remain clear, and still other substances might be added, and still the water remain clear while containing large quantities of foreign matters in solution, but it is difficult to make people bear in mind that many organic substances of vegetable or animal origin, in a state of decay, may be in a similar manner dissolved in water that appears clear and bright. That oxygen being the great purifier, the destroyer of filth, which when *completely* oxidized is broken up and made over into harmless compounds—incompletely oxidized substances, in other words filth—undergoing the process of decay, may be converted into forms easily dissolved in water, and which, being colorless, do not offend the eye, and tasteless and odorless, do not offend the senses in any manner. Nor do the germs of disease, or whatever may be their communicable virus, if not germs, which are clearly and incontestably conveyed by means of water and milk from place to place, and from one animal to another animal, as well as from one human being to another, do not reveal themselves to the senses in either, no more than the organic impurities which enable them to exist and multiply. Every one knows upon reflection that the finely-divided clay or earth that renders the water turbid, is more offensive than dangerous, and while not desirable is not harmful, as the consumption of the unfiltered waters of the rivers of the southwest abundantly confirms. The impurities that are the most dangerous are therefore those in solution, which are not removed by any filtration, although the percentage may be slightly decreased during the process.

Rivers and streams, therefore, that have received any considerable amount of sewage, should be avoided as sources of public supply. The excrementitious matter that is not completely oxidized is soon rendered soluble, so that a sewage-polluted stream shortly becomes clear; but the compounds formed are completely oxidized exceedingly slow. The nitrites, nitrates, phosphates, and sulphates, and the like, together with large quantities of infusorial life, the minute animalcules that live upon these decaying organic compounds, betray sewer contamination long after the water has ceased to offend the senses. The microscope here becomes a valuable aid by discovering to us these lower forms of organic life, the minute organisms invisible to the unaided eye. The presence of these infusoriæ in itself does not render the water harmful, but it is a proof or indication of large quantities of dissolved filth—organic substances undergoing changes in which, indeed, these animalcules assist. Their presence is beneficial, as they live upon the filth, are developed out of it, so to speak, and are part and parcel of the processes of its re-conversion into harmless and indeed useful productions.

With this fully understood, that water largely contaminated with sewage is unsafe as a source of supply, as no feasible processes will render it pure, and that water that has received sewage at all is exceedingly undesirable as a source of supply, even if the stream has flowed many miles, the advantages of filtration can be better understood, and what can and cannot be accomplished by it.

Right here, and at the expense of some irrelevance and of repetition, for the subject is of importance enough to bear repetition, it may be stated that freezing does not free water from organic impurities. The ice probably contains less than the water, proportionately, but enough remains to produce disease and death oftentimes, where ice has been collected from sewage-polluted ponds. As we have repeatedly come in contact, in different parts of the State, with ice-houses along the banks of polluted ponds, sometimes where the water was exceedingly vile, recognizable by its odor easily in the summer months, and, as a corollary, occasionally sickness and death directly traceable to such ice, the fact is noted in this connection while considering dissolved impurities.

In considering whether to use as a source of supply water that must be filtered that may be near at hand, and a clearer supply more remote, it must be remembered that one or more extra filtering-beds must be made in order that they may furnish the supply

while the others are cleaned, and that this cleaning must be repeated often; at least once in three months. Kirkwood gives $89\frac{3}{4}$ United States gallons per foot square of sand surface of the filter-bed per diem as an average rate. This is accurate enough for use in estimating the size of the beds required for the water supply. The rapidity of filtration depends, among other things, upon the amount of suspended impurities to be removed. In deciding upon the absolute need of filtration, the source of supply should be considered. Of course all water stored in reservoirs gets the benefit of subsidence, more or less. If a mountain brook or lake or upland surface-waters be the source of supply, filtration, though always desirable, is not indispensable; indeed, is hardly required. Water collected from streams running through inhabited districts is liable to be contaminated by the waste from factories, the washings from the fields conveying the refuse of plants, etc., as well as the fertilizers used, and all manner of floating débris. These, as well as the animal and vegetable growths in the water, are removed by filtration. The minuter forms of animal and vegetable life often exist in large quantities, and give by their decay in the pipes that fishy odor that is often so objectionable. Indeed, the removal of the smaller fishes, etc., becomes sometimes of importance.

BAD ODORS AND TASTES.

The objectionable taste and smell that all ponded supplies of brook and river water occasionally manifest, have been repeatedly brought to our notice as evidences of marked impurity, and as proof that the water requires filtration, and is unhealthful. This was the case this summer with the water in Hartford, New London, and other places, and we were called upon to pronounce such waters dangerous to health. Of course there are many smells and tastes that are proof of water that is not potable, but this peculiar odor and taste, variously described, is not deleterious to health.

The bad odor of the water may be due, according to Nichols, to a minute vegetable growth which often appears like a scum on the windward shore of a pond. This is a species of *Algæ Clathrocystis æruginosa.* These plants are highly nitrogenous, and their decay in the pipes causes this peculiar taste and odor. The water at the reservoir may be free from both, while the water drawn from the service-pipes possesses both taste and odor. That a bad taste and odor may be thus produced is uncontestable; but this is not a complete explanation. If the water

generally were loaded with the products of vegetable decay, even of such organisms, it would be unhealthful, but the minute quantities that produce this very unwelcome and decidedly offensive condition of the water causes no ill-health, and is objectionable from the disgust engendered by being compelled to use it. Repeatedly specimens from the reservoir were examined, and no impurities found, nor were there any found in the offensive specimens drawn from the pipes. This was the case in New London, Hartford, and other places. In some cases the reservoir in summer grows enormous quantities of water plants, which are the cause often of a bad taste. This differs from the minuter forms, and is of course more deleterious. Large collections of water plants which have a decided odor and taste *sui generis* have in one or two instances been brought to notice, and were apparently the cause, as it disappeared on their removal. This was on a small scale; a private supply, not a large reservoir. If caused by the minute algoid growth, filtration would be of no service in removing or preventing it. The growing and grown plants, alive or dead, would of course be removed, but not the spores or germs by which they are reproduced. Unless the water entered the service-pipes directly from the filtering-bed, the plants would soon reappear; but they require light and air for their production. Filtration, indeed, often removes large masses of vegetable growths, which often form a complete mat over the whole sand surface of the filtering-bed an inch or more in thickness, of course clogging the filter to a large extent. Where there is excessive growth of water plants, therefore, the water should be filtered at least in summer to remove them.

There is, it must be confessed, no complete explanation of the smell of these odors that appear in potable water, the *algæ* are sometimes the cause, but these are not always present to account for the odor. Those that do cause odors are of a bluish-green color, at times purplish or even black. The cucumber-like taste is not due to the growth or decay of plants.

COLOR BLINDNESS.

The Legislature passed an act, at the last session, requiring all railroad employees, engaged in any manner in running the trains, to be examined concerning their acuteness of vision and color perception. It was made the duty of this Board to superintend the execution of the law, and prepare rules and regulations, pre-

scribe methods in which, and the intervals at which, such examinations shall be made, and the form of certificates; in short, leaving all matters of detail to be determined by the Board. The certificates, however, were required to state that the employee possessed normal visual power and freedom from color-blindness.

As the work was in many respects novel, no State in this country ever having issued such a law; and the data as to the limits of visual acuteness compatible with safety, in railroad employees, or the compensation for defects in color perception, resulting from experience, knowledge of the road, and other standards in discriminating signals than color, *e. g.*, by the intensity of colored lights, the utmost care was used in deciding upon the tests to be employed, and those selected only that were generally recognized as decisive by all experts, and were proven by the most rigid practical tests. For deciding acuteness of vision and visual field, the methods in use by the best oculists in their practical work, in examining eyes and determining defects, were employed, having, moreover, the sanction of the International Medical Congress at Amsterdam, where were congregated the most celebrated oculists in the world. The methods of examination and tests for color-blindness were also confirmed by the same authority, and are those in use by the United States marine and naval services; in a word, the most reliable tests known.

As it was obvious that all employees did not require the same strictness in examination, two classes were formed, the first including engineers and firemen, and at first brakemen, but later these were transferred to the second class, leaving engineers and firemen only in the first class, all others in the second. It was intended to have finished the examinations and corrected any injustice, and made compensation for the counterbalance of defects by experience, etc., by the resulting data. A rule was therefore passed that in case of employees who have held their positions five years or more, the standards required in each class shall be determined by special instructions from the Board of Health. All that failed to pass the tests were to be informed that this was not final, but subject to revision, as, had the examinations not been interrupted, there would have been ample time before the 1st of October, and no one was to be dismissed until after that date.

By conference with the examiners and with the railroad officials, those that, although more or less defective under the rules, were still competent and safe men by reason of some compensating cir-

cumstances, would then have been furnished certificates, and the best results attainable under the law have resulted. Any general fact recognized during the course of the examination was at once acted upon, *e. g.*, congenital defects of vision, or the results of injuries received sometime previous, the condition of the eye having become stationary, and experience proving the capability of the employee, a special rule was issued deciding that certificates should be issued to such employees. There was, however, such opposition to the law, and so general a request for a modification and lowering of the standards, manifested by a petition signed by six thousand, as stated and apparent from the bulk of the documents, also, a resolution from the convention of both political parties, that action was taken at once in regard to old employees. The details of the examinations, the law, rules of the Board, and the like, are given at length later. The results of the examination and a presentation of the whole subject may be found in the reports of the examiners and the paper by Prof. Carmalt. It was not to be expected that any tests by which men were rejected would be satisfactory to the men rejected; and such has proven the case, as bitter complaints and appeals have been directed against the tests by flags and lanterns as against the others.

For the detection of color-blindness, Hohlmgren's worsted test is the most reliable and unfailing. When any objects, whether it be flags, lanterns, or ribbons, are held up, as there are only two colors, white being told by every one, when asked what the color is he has an even chance of guessing right if he were totally blind. In the case of old employees, other methods of recognition have been learned, so that the defect is certainly more easily condoned. As for testing acuteness of vision, the side of a barn-door might as well be used as large objects even if waved most frantically. The tests for old employees rejected by those first established was, however, in deference to public sentiment, lowered to what is called by oculists two-thirds vision, in other words, one-third less sharpness of vision than the healthy adult eye, and the fractions in class second reduced to that standard, that is, lowered one-third. With reference to new employees no changes were made.

DISEASED MEAT.

There is probably no very clear or adequate idea of the extent of diseases among domestic cattle, and especially those communi-

cable to man. Investigations upon this subject have been commenced, and the results will be given later, when the subject can be more exhaustively treated. The able paper of Dr. Cressy on the relation of tuberculosis in cattle, and the consumption of milk from cows thus affected, and its influence upon health, deserves careful and thoughtful perusal.

ADULTERATIONS IN FOOD.

Investigations in this department have been carried far enough to show that such do exist, and to a considerable extent. The most common, however, are falsifications, as meal for mustard, where a cheaper but harmless substance is used to mix with a higher-priced one, for purpose of gain. A complete report, that is, enough for all practical purposes, it is hoped will be ready for our next report. There are many adulterations that are harmless that have been used to cause a great sensation, as glucose, which is perfectly harmless, simply is less sweet than the syrup it is sold for, and cheaper. The adulteration of milk, especially that sold for infants' food in our cities, is, however, a matter of graver importance. Fortunately it is not extensively carried on. The impoverishment of the milk, especially in the summer months, lays the foundation for those digestive troubles that slay so many innocents in the first few years of infantile life. A brief account of these, and the methods of adulteration, follows.

SICKNESS FROM IMPURE ICE.

In several instances the attention of the Board has been drawn to sewage-contaminated ponds with ice-houses on their borders, and strange to say, although the evidence of disease thus caused is so conclusive, many still adhere to the idea that water purifies itself in freezing. Even the process of melting the ice and demonstrating the presence of organic pollution by the microscope, will not always convince against the force of the pocket argument. Several isolated cases of enteric trouble, and one death from the free use of ice polluted by sewage, have been reported during the year. Fortunately an enlightened public sentiment is compelling the abandonment of such sources of supply, customers insisting on knowing where the ice they buy is cut.

THE LOCATION OF NUISANCES.

There is one power that should be possessed by the Board, and that is the location of injurious trades and manufactories where they can pursue their necessary avocations without detriment to the public or private health. Much hardship and loss may fall upon well-disposed persons who are carrying on useful but dangerous manufactures. By the action of the local authorities they are justly compelled to move. It is then often difficult to secure a location. However safe and harmless to any neighboring interests such may be, if the design becomes known all sorts of legal annoyances are inflicted; meanwhile the business goes to the dogs.

The local Health Board has no power to designate such location even if it desired, which it is far from doing. A case in point: A combined tripe and bone-boiling establishment was ordered to remove, very justly, beyond the city limits. The owner applied for a location to both local and State Health Boards, as suits were threatened wherever he commenced operations. Neither could help him, although we gave the opinion very decidedly that no harm could result to any one from his new location. The power to settle the question would be of great value to both parties, setting the minds of his neighbors at rest and him from continued annoyance.

THE LOCATION OF SLAUGHTER-HOUSES.

These should be banished outside city limits unless conducted on the abattoir plan. The immense pork-packing establishments are free from odor during the hottest summer months, although hundreds of hogs are butchered daily; indeed, the estimate is low. Small establishments, if conducted separately, should be without city limits, as with ordinary care alone they become offensive during the hot months.

A case was brought to our notice of a slaughter-house located on a hill-side, a few rods from a reservoir used for collecting water as a supply for a city. It was unhesitatingly pronounced a nuisance, dangerous to health. The proximity alone did not determine this, but the slope of the bank. Had this been in the other direction the danger thence arising would have been slight.

SANITARY INSPECTIONS.

These increase in number each year, especially of buildings. It is singular how ingeniously sanitary nuisances are constructed, as

if the design were to make a bad condition of affairs. To illustrate: For several terms the water in a large school-building was considered to be contaminated, and disused, as it smelled badly whenever any was drawn from the faucets. An investigation was made. In the rear of the building was a large privy-vault twenty feet square or more, and ten to fifteen feet deep, and unventilated except by the seats, which did not afford much, the building, brick, closed most of the time. A large earthenware drain led from the sinks to this vault, and whenever the water was drawn the displaced air from this drain passed up. Moreover, whenever the wind was in the right quarter it forced a current of foul air from the vault into the building up through this drain. A trap outside and thorough ventilation of the vault by a shaft running through the roof, was advised and remedied the evils.

SCHOOL HYGIENE.

The report upon the discussions relative to warming and ventilating the new High School-house at Bridgeport, forms a valuable contribution to this subject for every city and indeed school-district in the State. The valuable paper upon the subject by Mr. Briggs of Philadelphia presents the points clearly and tersely. It is not probable that any school-building in the State will be warmed in a more healthful manner, if, indeed, any equal it. It was intended, this year, to have published a pamphlet on school hygiene, for general use, but there are several peculiarities that yet require investigation. Meanwhile, nothing of greater value could have been presented than this. The subject is still under consideration and study. Many letters of inquiry in reference to the details of construction of school-houses have been addressed to us this year, a gratifying indication of increased attention to school hygiene.

MONTHLY SANITARY REPORTS.

These reports concerning prevalent diseases, commenced the first year of the existence of the Board, have been continued and extended during the present year. Much more general reports are received, and the State is more completely represented. Some elements for comparison with preceding years have now accumulated, and we are enabled to add the death-rates since the completion of the tenth census. The zeal and interest of our correspondents continues unabated, and they deserve our warmest gratitude

for their labor of love. We now receive in exchange similar reports from London and the principal cities in England, Ireland, and Scotland, Paris, Vienna, and Rome, the National Health Board, and many States and cities in the United States. It is hoped to utilize these, during the coming year, for the benefit of the physicians of our own State.

LIBRARY.

Many valuable contributions have been made to the Library by gift and purchase during the year, not the least of which are the exchanges from other similar organizations. Our special thanks are due to the Hon. J. R. Hawley for valuable gifts. The importance of the Library to the work of the Board cannot be overestimated; also, indirectly, to other Health Boards and physicians that consult it.

POLLUTION OF STREAMS.

The discussion on the pollution of Park River, and the means proposed for its relief, together with the profile-map of the river and the sewer map of Hartford, which shows the basin of the river. The branches that unite to form it are partly shown. The stream that receives much of the sewage of New Britain is indicated. The initial portion of this is seen in the New Britain map in our second report. In its course through that city it is turned into the main sewer. This subject is further illustrated by the discussion of the condition of the stream in South Manchester that receives the sewage and manufacturing waste of that village. The importance of this subject in this State has hardly commenced realization, and as yet no action has been taken to remedy the existing evils, except in Hartford, where the plan for the relief of Park River is under consideration.

THE SALE OF POISONS.

A law was prepared on this subject last year, but as a much more complicated one was included in the pharmaceutical bill, it was not presented, to leave a clear field for that which was continued from the preceding session. The importance of the subject demands attention, and, as the bill referred to was rejected, there is now nothing in the way of the simpler law, and we earnestly advise its passage.

LOCAL HEALTH BOARDS.

We have under consideration a digest of all the laws on health, for the use of local boards. The desirability of a general revision of those laws has alone restrained its preparation. The powers, while ample enough, are so ill defined that in one case even a lawyer did not know how to call together the town board of health when action on a certain local matter was desirable. In case of small pox, perhaps, the selectman has more arbitrary powers than any despot. Not but that this is desirable, but it is exceedingly vague, and there should be no ambiguity about the organization of a town board, and its sessions for sanitary work. The powers and duties of these bodies should also be more clearly defined, and the duties of the people towards them, especially in relation to the report of malignant, contagious disease. In the cities many of these difficulties are avoided by action of the city council in forming a city board of health, uniting the two. If all the city boards could be organized on one plan, involving greater permanence of membership, more direct responsibility, and more clearly-defined duties, their work would be much easier and efficient.

THE HEALTH OF WORKERS ON RUBBER.

The valuable paper by Dr. Bartlett is the first of a series on the relations of trades and occupations to the health of those engaged in them. This is among the first studies upon this special branch of manufacture. The literature upon the subject is very meager, so that there were no other data to go by except those now collected. The paper, therefore, forms a valuable contribution to the literature of hygiene of trades and manufactures. As soon as the case will allow, the results of investigations in other fields will be given. This State, with its multiplicity of industries, affords ample opportunities for these studies.

SOME OF THE RELATIONS

OF

MODERN HEALTH BOARDS

TO THE

Material Prosperity and Wealth

OF A COMMUNITY.

BY

Prof. W. H. BREWER,

SHEFFIELD SCIENTIFIC SCHOOL.

PUBLIC HEALTH vs. PUBLIC WEALTH.

The following letter of the President of the Board of Health of the City of New Haven to the Court of Common Council of that city, states so clearly a natural law of so much importance to every town in the State that it is reprinted here.

With the presentation of the last Annual Report, I called the attention of your Honorable Body to some of the functions of Health Boards in general; with this Report I will ask your attention to *some of the relations which modern Health Boards bear to the material prosperity and wealth of a city or community.*

The *first* need of civilized society is the protection of life and property from violence. Without this, civilization itself is impossible, hence it has been the first and greatest aim of all nations and communities, in all ages, and in every stage of social progress. To secure it, laws are made, penalties imposed, and all the expensive machinery of courts and officers have been devised and are supported, armies are maintained, and wars waged when necessary, for national existence as well as civilization depends upon it. In these latter days, and as an outgrowth of an enlightened civilization, along with this protection, personal liberty has been better secured, until now the importance of this ranks next to personal security from violence; but, in all times, the liberty of the individual has been held to be subordinate to the safety of the community.

In these modern times, and as matters now stand, with both of these secured, there is still another requisite for a community to be *prosperous.* Each individual who constitutes the community must not only be protected in his person, property, and liberty, but his life and health must also be protected from certain diseases and dangers whose power for evil have grown along with our civilization. For an individual to prosper by his labor, he must be reasonably well, and this is just as true of a community or a State as it is of the individual or family. The industrious laborer may

be thrifty and add to his savings year by year, if he be well; but when sickness comes upon him, and his earnings cease, then his savings go, and his property is soon eaten up. Or if he have much sickness in his family, however industrious he may be, he cannot be thrifty, for sickness is more expensive even than luxury. And this is just as true of a city or a community. In the intense competition of these modern times, no sickly community can be prosperous. It may be intelligent and moral and industrious, but it must be poor; and it is to this aspect of the importance of Public Health to which I now wish to call your especial attention.

Every student of History and of Political Economy notices the wonderfully rapid accumulation of wealth and capital in modern times compared with what it has been in previous ages. The material wealth and working capital of the civilized world has more than trebled within less than a life-time. The accumulation of wealth and property (and it is this which represents the aggregate savings from labor) during the last few years more than equals all that had been saved in all the thousands of years that had gone before, and that, too, while there has been a more general enjoyment of the comforts of life, and a much greater indulgence in its luxuries.

The nature and sources of this rapid growth has been the subject of much discussion by statesmen and political economists. The causes usually assigned are the invention of modern machinery, the use of steam as a motor, the growth of modern means of transportation by sea and land, the application of the natural sciences to the arts and industries, the spread of popular education, the diminution of wars, and the production of the precious metals.

There is no question but that each and all of these have had their influence, but there is one still greater cause which is too often overlooked simply because it is not so conspicuous. The greatest of all causes is to be found in the better average health of civilized countries, and the longer average term of life which is now secured to working men.

It was not merely war, nor because they did not have steam, nor did not know about greenbacks, that kept the masses in poverty all through the middle ages—it was disease and the death that came from disease that kept the nations poor.

With all our material resources, with all our boasted inventions, our railroads, and our steam-power, we would be as poor to-day as they were then, were disease so common, pestilence so terrible and

wasting, and the average years of a man's working life so shortened, as they then were.

The history of the middle ages is a sad succession of plagues, of cities devastated, of states impoverished, of laborers swept away in millions by successive waves of pestilence that followed each other as often as cities grew populous. Between the common sickness which was ever present and the pestilences which swept off their millions at a swoop, the average period available for actual labor in man was perhaps not more than half what it now is. Meanwhile, it took just as long to rear children to a working age as now, and sickness was just as expensive; so, between the diminished power of production, the waste by sickness, the panics and checks to commerce caused by plagues, which were raging somewhere all the time, it is no wonder that wealthy people were comparatively few, and the masses sunk in abject poverty.

If we are tempted to think that we are saved from this by steam, or machinery, or increased production of the precious metals, let us look at any pestilence-stricken city of modern times. A single pestilence of but a few months came near bankrupting Savannah, and laid a check on her progress and a burden on her resources which it will take many years to overcome. Or, worse still, Memphis with its two pestilences. And such may be the loss to any American city if it neglects sanitary laws.

Our modern civilization is one of intense competition. Each producing community is now in a struggle with all the rest of the world, as it never was before. If it have any special advantage, it may prosper; if it have any special disadvantage, it either lags behind in the swift race, or by standing still it relatively declines, or else it goes under in the hard struggle of productive or commercial competition. And what heavier burden to bear than sickness?

And yet this fact is liable to be overlooked or forgotten. The healthy man hopes that sickness will never come, and may be careless of his health; and the healthy community rarely awakens to danger until epidemic sickness sets in, and then the loss is actually begun.

It is the part of Sanitary science to point out the dangers and suggest means of prevention, and when epidemics actually set in, to suggest remedies; it is the part of Sanitary legislation to provide means to apply these remedies; it is the function of Health Boards to administer them. But from the nature of the case, the better

they do their work the less obvious are their labors. The officer who heroically stands at his post during the time of pestilence, labors to stay its dread work, helps the suffering, and comforts the dying, is a hero; and the heroism is of a kind that can be seen; no praise is too high; but the other officer, who by his labors *prevents* the pestilence, and keeps it so far off that the danger is scarcely seen, receives no such praise—too often, in its stead, criticism and opposition and indifference.

It is because of the nature of Sanitary work that its value in increasing the prosperity of a city is so often overlooked. In the ordinary pursuits of business the clang of machinery, the brilliancy of the applications of science to the arts, the bustle of business, the romantic ways in which the precious metals have been discovered and won, are more conspicuously in the eyes of the public than the quiet, persistent, unromantic but heroic fight with unseen but unwholesome influences, which lurk in the air of our towns. These malicious influences, mostly growing out of our modes of life, are ever present in all our cities, ever growing unless checked, always producing disease, and from time to time specially inviting pestilence, as persistent as sin, as tireless as nature, and as pitiless as death.

The rapid growth of town and city populations as compared with the country, during the last forty or fifty years, has been made possible only by the power which modern sanitary science gives us to prevent, to check, and to combat epidemics. As matters were before, a pestilence of but a few weeks or months would put back the growth of a city for years. This city has had but one visitation of yellow fever; it lasted scarcely two months, and from all I can ascertain by a careful investigation of the matter, it took from eight to ten years to recover from that shock. Indeed, can we say that it *ever* recovered? What New Haven might have been, had it not been for that check, just at a time of rapidly growing commercial importance, we can never know; but that citizens left with their capital to go into business elsewhere, and never came back, and that trade left the place and never returned, is certain. What "*might have been*" had this pestilence not fallen on us eighty-six years ago, we can never know; what *may be* if another pestilence comes, we know well. Too many cities have had such a bitter experience even in modern times for us to be ignorant of the effects.

We insure our manufactories from loss by fire to ensure their

being rebuilt if once burned,—even with this, the temporary suspension of the work may drive trade elsewhere. Hence premiums are cheerfully paid to guard against the possible contingency, and before the conflagration comes we cheerfully purchase fire engines and apparatus, and organize skilled men to use them when the emergency comes. Here it is recognized that all this, though expensive in the beginning, is cheap in the end; and yet how reluctantly any such means are taken to guard against a worse destroyer of our wealth and prosperity! The arguments used even by official bodies against adequate support of public health administration, in many if not most cities, are curiosities of inconsistency, and will be cited as such by the next generation.

It must not be forgotten that Health Boards are now more strongly demanded and called for because of their pecuniary importance than because of their function in allaying human suffering or saving human life. So long as merely men died, and health was lost, and sorrow fell on thousands of homes, Memphis went on as of old, dug her cesspools deeper, and more of them, and did without sewers; but when the loud voice of trade cried out, "we cannot afford to allow Memphis to longer stand as a menace to the commercial prosperity of the great Mississippi Valley," then, and not till then, was a system of sewering begun.

A high death rate means lessened vigor, lessened powers of production, a check on prosperity, a burden on industry. A low death rate in modern cities can only be secured by public sanitation, and by an intelligent and efficient coöperation of the public with an active Health Board. A single epidemic, but one-fourth as bad as that in Memphis last year, would cost this city more, and leave us with higher taxes, than the most expensive system of sewers and of garbage collection that was ever dreamed of here. *And there is nothing to prevent it except public sanitation.* We had that very disease here once, and the city did not recover its prosperity for ten years, and it lost some phases of prestige which it never regained. An epidemic of small pox a few years since lost to the city of Philadelphia, in ways which could be estimated, above twenty millions of dollars. This city a little later was seriously threatened with a similar epidemic, which was effectually stayed, and the health officials were perhaps more severely criticised for their work than for any other one thing they have ever done! The results, however, have amply demonstrated the wisdom of their action.

The fact wants to be kept before the public, that as production and commerce and trade are now carried on, few cities can afford to allow a pestilence to invade them. *And if it comes to a city with the natural advantages of soil and climate we have, it is due either to official ignorance or public neglect.* There is perhaps not a single kind of pestilence which has afflicted any civilized city of temperate climates during the dark ages, or since, over which we have not now control, if the community act up to the light and knowledge we have; and on the other hand, as business is now carried on, no city can be so afflicted as many then were, and not be bankrupted and financially ruined.

Moreover, a pestilence is only an intensified manifestation of disease; most of its disastrous effects may be produced by the less intense form of prolonged but general ill health, and it is perfectly safe to say that no northern city can be really prosperous and really sickly at the same time. The health of people is the real foundation upon which the prosperity of the city and the wealth of the community depend.

The money value to New Haven of a reputation for healthfulness should not be slighted or under-estimated in our efforts to maintain our beautiful and our beloved city, and no one single fact will do more to foster and maintain our material prosperity than to continue to have "the lowest death-rate of any seaport of its size in the world."

ON THE MANUFACTURE

OF

INDIA RUBBER GOODS

AS RELATED TO THE

HEALTH OF THE OPERATIVES.

BY

WALTER R. BARTLETT, M.D.,

NEW HAVEN, CONN.

MANUFACTURE OF INDIA RUBBER GOODS.

In compliance with the request of the Secretary of the State Board of Health the following brief investigation of the above subject has been undertaken and the results are here submitted. The manufacture of rubber boots and shoes, as well as other rubber goods, is carried on to a large extent in the State of Connecticut, and in New Haven particularly there is located one large establishment employing from five hundred to one thousand hands, and is known as "The L. Candee & Co." Taking this as a representative concern, and one in which the business is well exemplified, I will here give the process by which the work is there conducted. The crude rubber is designated as Para and Africa rubber, names derived from the respective localities from which it is obtained. The Para rubber comes in large ovoid masses, weighing several pounds, amber colored, of a uniform consistency, and free from odor, while Africa rubber comes in small bits, more or less adherent together, and is of a strong odor. It is not used as much as the Para rubber, not being considered to be as eligible for working as that. The first process through which the crude rubber passes is that of grinding, (the Africa rubber having first been cleansed by soaking in large tanks of water prepared for the purpose,) that is, it is passed between large iron rollers running closely together, from which it comes in sheets. This takes place in what is called the wash-room. These sheets are then transferred to the drying room, where they are hung up until dry, for a period of three or four weeks. They are then transferred to the grinding-room, and there passed through another set of rollers which reduces them to semi-transparent sheets of uniform consistency; they are then rolled up into large masses, when they pass, while soft, to the mixing-room, where they receive the chemical compound which gives them the dark color of rubber as it usually appears. This compound is composed of lamp-black, whiting (carbonate of lime), sulphur, litharge (oxide

of lead), and tar, and is poured upon the rubber as it passes slowly through sets of rollers, and thus becomes thoroughly incorporated with its substance. From these the sheet is transferred to other rollers, where it is stamped and variously treated, with reference to its future use in the manufacture of the shoe; then it passes to the cutting-room, where it is cut out according to the pattern stamped upon it; then it goes to the cement and varnish-rooms, where the shoes or boots are put together and varnished; from there the goods pass to the drying-ovens, where they are thoroughly dried, at a high temperature, in a room specially arranged for the purpose, when they are ready to be packed for market. Such is an outline of the manner in which the caoutchouc, or crude rubber, is transformed into marketable and useful goods, and the question now comes up, are there any dangers to health connected with such manufacture? Practical experience has shown that such dangers do arise. As we have shown, the only rooms in which chemicals are used are the mixing, the cement, and varnish-rooms. In the other rooms the only source of danger would be from dust or from impure air from lack of ventilation; the former cause is necessarily, in a great measure, eliminated, as dust is highly detrimental to the finish and appearance of the goods, and in the grinding process water is freely used. The chemical compound used in the mixing-room then furnishes the source of the dust which arises, while the remedy for defective ventilation is obvious. The chief causes of danger to health then lie in the chemical compounds, and as has been stated, the mixture which is used in the mixing process contains litharge or lead. It is this which produces the harm, the other ingredients being comparatively harmless. Lead, it is well known, may be absorbed into the system through the respiratory organs and through the skin, or it may pass into the stomach; in all of these ways it reaches the system in these instances. As the mixture is poured upon the rollers the dry dust arises, and the workman, as he stands over them, receives it into his mouth and respiration, and upon his skin; this is absorbed, and in time sufficient lead is introduced into the system to produce the symptoms of lead-poisoning, viz.: sickness at the stomach, disordered digestion, and finally colic, and in some extreme cases paralysis of the extensor muscles, while in some cases the symptoms are general debility and prostration of the system at large, both nervous and muscular, with feebleness of the pulse, neuralgic pains in the legs and arms, and in some

cases albuminuria occurs. The other chemical likely to produce harm is found in the cement and varnish-rooms. With the above company the process of cementing and forming the shoe upon the last is carried on largely by females, and likewise the varnishing process; the cement is composed of rubber, dissolved in benzine. Of course the cement-room is thus filled with the odor of benzine, while the adjoining varnish-room is likewise filled with the odor of varnish, which also contains benzine. Here lies a danger to health. It is reasonable to suppose, and the fact has been observed by the writer, and by physicians with whom he has conversed, that the female operatives who work in these rooms are subjected to various disorders of the general health; the symptoms are those of disordered menstruation, dysmenorrhœa, in some cases menorrhagia, a general debility, sickness at the stomach, and disorders of the nutritive functions in general, dyspepsia, and even phthisis, has been thought to have been superinduced in this way, as a consequence of lowered vitality. Another point not to be overlooked in this connection is the effect of the pressure of the last upon the chest in forming the shoe, especially in the case of those who have not reached man or womanhood; this, long continued, tends to produce contraction of the chest, and consequently phthisis may be superinduced.

Another large establishment is located in Colchester, and employs from five hundred to nine hundred hands. Drs. S. E. Swift and S. L. Chase have kindly answered my inquiries as to their experience in reference to the matter, and both mention lead poisoning in its various forms as being of common occurrence. In addition Dr. Swift speaks of urinary disorders of "greater or less severity" as occurring, attributed by him to the benzine, which readily yielded to treatment if the patients left the mill; while Dr. Chase has had a suspicion of a tendency to Bright's disease among the operatives, but has not fully verified it. Dr. Meers of Naugatuck, where a large factory is also located, has also seen several cases of lead poisoning from the same cause. Such being the dangers incident to the occupation, what are the remedies? With reference to the chief danger to health, viz., lead poisoning, there should be first free and complete ventilation of the mixing and grinding-rooms. It would be better even if the mixing-room could be completely disconnected from the others, either being located in a separate building, or else having no communication with the other rooms except through an open

air passage-way. Secondly, the operative should be of temperate and cleanly habits, being careful to keep his hands well washed before eating, while daily bathing of the whole person is also important; his bowels should be kept regular, and in short the whole hygienic regimen should be observed. Intemperance is a powerful predisposing cause to lead poisoning from the lowered vitality of the system which ensues, and a very large proportion of those affected are victims of this habit; the remedy for this is obvious, strictly temperate habits. The wearing of respirators might be advisable in some cases.

With reference to the danger arising from the vapors of the cement and varnish-rooms, here again ventilation, thorough and complete, is the great desideratum. With the "L. Candee & Co." these rooms are large and well lighted, with plenty of provision for ventilation by the windows at least, and it would seem that the danger there might be easily reduced to the minimum; yet the fact that it does exist should be well recognized, and guarded against accordingly. As relates to the pressure of the last upon the chest, those of mature years should be employed in this work as far as possible, or the operatives should be taught to avoid this habit, as I am informed that it is not necessary to do so, or as recommended by Dr. Swift, "An oval convex shield of thinnest sheet-iron covered with leather, and fastened by a belt around the body to rest the last against, the convex portion presenting a broad surface to the last," should be worn, which would tend to relieve the chest from undue pressure. In closing, I would express my obligations to the officers of the "L. Candee & Co." for courtesies shown me in the pursuit of my inquiries, and a ready willingness to aid me in my investigations.

SECRETARY'S REPORT.

The past year has been one of unusual activity in many respects. The amount of direct sanitary work that devolves upon us is constantly increasing, both in special investigations, the study of the causes of disease, analytical work, and correspondence, especially in the answering letters of inquiry concerning almost every department of sanitary science, both domestic and public hygiene. These are very gratifying evidences of the increasing attention to sanitary subjects throughout the State. There have also been many extra sessions, arising from the extra duties involved in the color-blind law, the execution of which devolved upon this board.

The increasing demand for copies of our report, while it is very gratifying, is also in one sense a matter of annoyance, as the demand by far exceeds the supply. Out of the thousand copies printed seven hundred or more are required by the Comptroller for the supply of the legislature and other officials, so that it is impossible to half supply the demands for our second report.

This has been also well received abroad, and we were favored by the German government with a request that copies be sent to the President of the Department of Statistics at Berlin. Also by a special recommendation of our report to the Governor of New York, by an eminent sanitary authority of that State, as containing elements worthy of imitation in forming a State Board of Health in New York. We ought to have a sufficient number of copies, so that every physician and clergyman in the State, at least, might be supplied, instead of only now and then one. It would add greatly to the accuracy of our registration returns if every physician received a copy, and thus could see the effect of their deficiencies in the reports from their own towns.

The first subject that engaged attention was the appearance of small pox in December. Instructions concerning its management were issued, which are here epitomized and gathered together for general distribution.

Allusion has been made to the sanitary surroundings of the Portuguese settlement. Although sanitary surroundings have but little, if any, effect upon a disease like small pox, so far as prevention is concerned, it is true that the reverse condition adds much to its malignancy, favors its spread, and renders an epidemic possible by furnishing the proper aerial conditions for preserving and transmitting the virus of the disease. The condition of the whole neighborhood evidenced the greatest carelessness in regard to the most essential requisites for health. Privy-vault, sink-drain, and well were often in close proximity. In some instances the sewage infiltrated the cellar walls of the dwelling-houses, which stood on lower ground. Pig-pens, hen-coops, and the lairs of other domestic animals were scattered around thickly, and in what might be called picturesque confusion. The overcrowding in relation to small pox is, however, much more dangerous an element than any other unsanitary condition, as infection often takes place before the patient can be isolated. The importance of the prompt report of a case of malignant contagious disease to the health authorities demands a revision of our laws, that the duties of householders may be more clearly defined, as well as the exact powers and jurisdiction of the authorities. There is vague power enough already. What is requisite is an exact statement of the duties on both sides, and a little more discretionary power conferred upon health boards as to the time when convalescents and attendants upon such cases shall be allowed to mingle with the public, children to attend school and the like. This latter is fully as important in scarlet fever, as in that case the patient carries about the germs of the disease for some time after convalescence is established.

Isolation, disinfection, and thorough and complete vaccination of all unvaccinated and unprotected persons, that is, those that need revaccination, were the means used to control this outbreak. This vaccination was thoroughly carried out, and especially of the school children. It is advised that a certificate of recent vaccination, or of reasonably safe protection from a former successful vaccination, be required of every new pupil before he is allowed to attend school. This may be obtained from the family physician, and provision should be made so that those that prefer could obtain such certificate, free of expense, from the town physician, or one of the Board of Health. The following, including the description of the pest house, contains ample instruction for contending with

outbreaks of this disease. It is, indeed, only by neglect of vaccination that its existence is continued.

Small pox is one of the most contagious diseases. One attack usually protects the person from the disease subsequently, but is not so efficient as vaccination. The disease is due to a specific contagion conveyed from person to person, by actual contact, by infected clothing, bedding, rags, paper, or from any articles infected, and by the discharges from the pustules or the crusts that form upon them. The case should be isolated as soon as recognized.

During his illness the patient infects the clothing he wears, his bedding, and more or less the articles in the room. All the rags and the like used in the care of the patient directly during his sickness should be at once burned. Infected articles, if left to themselves, preserve their infectiousness for a very long time.

The interval of time from exposure to attack is ten to fourteen days. As vaccination works quicker (Hart, eight days), there is often time to avert the disease by immediate vaccination. In preparing the room to be used, all unnecessary articles of furniture, and especially carpets and woolen goods generally, should be removed. The bed should be so placed that the attendant can pass entirely around it. The room should be as far as possible isolated from the rest of the house, and be well ventilated.

Disinfectants should be freely used. If the room is unavoidably near others, a sheet wet with the zinc solution, No. —, may be hung upon the door. Attendants should be as few as possible, and should avoid intercourse with unaffected persons.

All persons known to be sick with the disease should be carefully and completely isolated from the public, and the case reported to the Board of Health at once, and their directions followed. Unless the disease become epidemic and general, direct contact with some infected article is necessary in order to communicate the disease. The exhalations from the patient and the products of the disease may charge the air about, for a limited space, but with proper care and prompt isolation there need be no infection, and the first case be both first and last.

VACCINATION.

As a rule, one successful vaccination in childhood protects until about fourteen to sixteen years of age. If, however, there be epidemics of small pox near, or the danger of exposure great, the

process may be repeated oftener, as there can no harm result, as no effect will be produced if the person be already protected by the previous operation. One trial, however, in face of danger, is not conclusive, and care should be taken that the operation be thoroughly performed. The following summary is condensed from "Hart's Truth About Vaccination," mainly, and is the result of the labors of a special commission appointed in England to thoroughly investigate the whole subject. Credit is here given to avoid quotation marks.

1. Small pox, in its natural state, is one of the most loathsome and terrible diseases, attacking a whole population indiscriminately and killing a very large proportion of those it attacks.

2. Those that recover remain for life disfigured, are often left consumptive, weakly, or maimed, and may wholly or partly lose sight or hearing.

3. *The character of small pox, uncontrolled by vaccination, remains the same, as shown by its present mortality among unvaccinated persons.* The statement is often made that this disease has lost much of its violence, but the statistics of the unvaccinated victims tell a different story.

4. Vaccination does not endanger life or health, but does completely exhaust the susceptibility of the system to small pox, in the vast majority, when properly performed.

5. The objections have no foundation in fact, and are disproved by all the evidence on the subject; nor does it render the person more susceptible to other diseases.

In England, the small-pox death-rate has decreased one-half since the introduction of compulsory vaccination. In many cities, where periodical inspection of all the schools and house to house visitation, with free, though not compulsory, vaccination, takes place often, the disease is hardly known unless imported, and then never becomes extensively prevalent, but is at once stamped out.

6. The number of persons efficiently vaccinated or successfully revaccinated, that are attacked even during an epidemic, is very small; and where the vaccination has been imperfect the disease is usually greatly modified in severity.

7. When successful vaccination and revaccination has been done, the proportion of deaths to attacks is but one-seventieth part of that in unvaccinated persons. By universal revaccination small pox has been stamped out of the army and navy. Experience

here shows that one successful revaccination in an adult is sufficient (England).

8. Unless there be immediate danger, only persons in good health should be vaccinated. Care should be taken in children that they have no skin disease, nor recent exposure to measles, scarlet fever, or erysipelas. By neglect of the latter precaution much undeserved opprobrium has often been cast upon vaccination. Take care that the vesicles are preserved uninjured, and avoid a premature removal of the crusts. In family practice an accurate registry of the results of each vaccination should be kept. Lymph from revaccination is worthless, and in general that many removes from the bovine loses its protecting power.

In many places bovine virus only is used, but with ordinary care humanized virus is safe, the chances against it infinitesimal.

9. Keep instruments used for vaccination clean and bright, and always have water and a towel handy, to cleanse the instrument before using a second time, even in the same family. A small scalpel or tentomy knife is better than any patent or spring contrivance, as it is easily kept clean and free from rust or stains.

DISINFECTING.

Clothing and bedding may be disinfected by intense heat, but the better way is by burning sulphur in the room. All woolen articles, mattresses, bedding, and the like used about the sick, may be disinfected by burning sulphur after tightly closing the room. Place the sulphur in iron pans supported upon bricks placed in tubs containing a little water, set it on fire by means of hot coals, or a few spoonfuls of alcohol.*

Carpets are best left on the floor, but after fumigation should be taken up and well beaten. After fumigation the articles should be placed in the open air and sunlight and beaten. Other articles may be hung up losely.

It is better to burn all articles of clothing or bedding, but if this cannot be done, the following solution may be used:

Sulphate of zinc, four ounces, and common salt two ounces to a gallon of water. Half this strength of solution should be used to boil the articles in.

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* Eighteen ounces for each thousand cubic feet is shown to be necessary by the recent experiments of the National Board of Health. For larger or smaller rooms use proportionate quantities.

Linen and cotton articles should be placed at once in the solution.

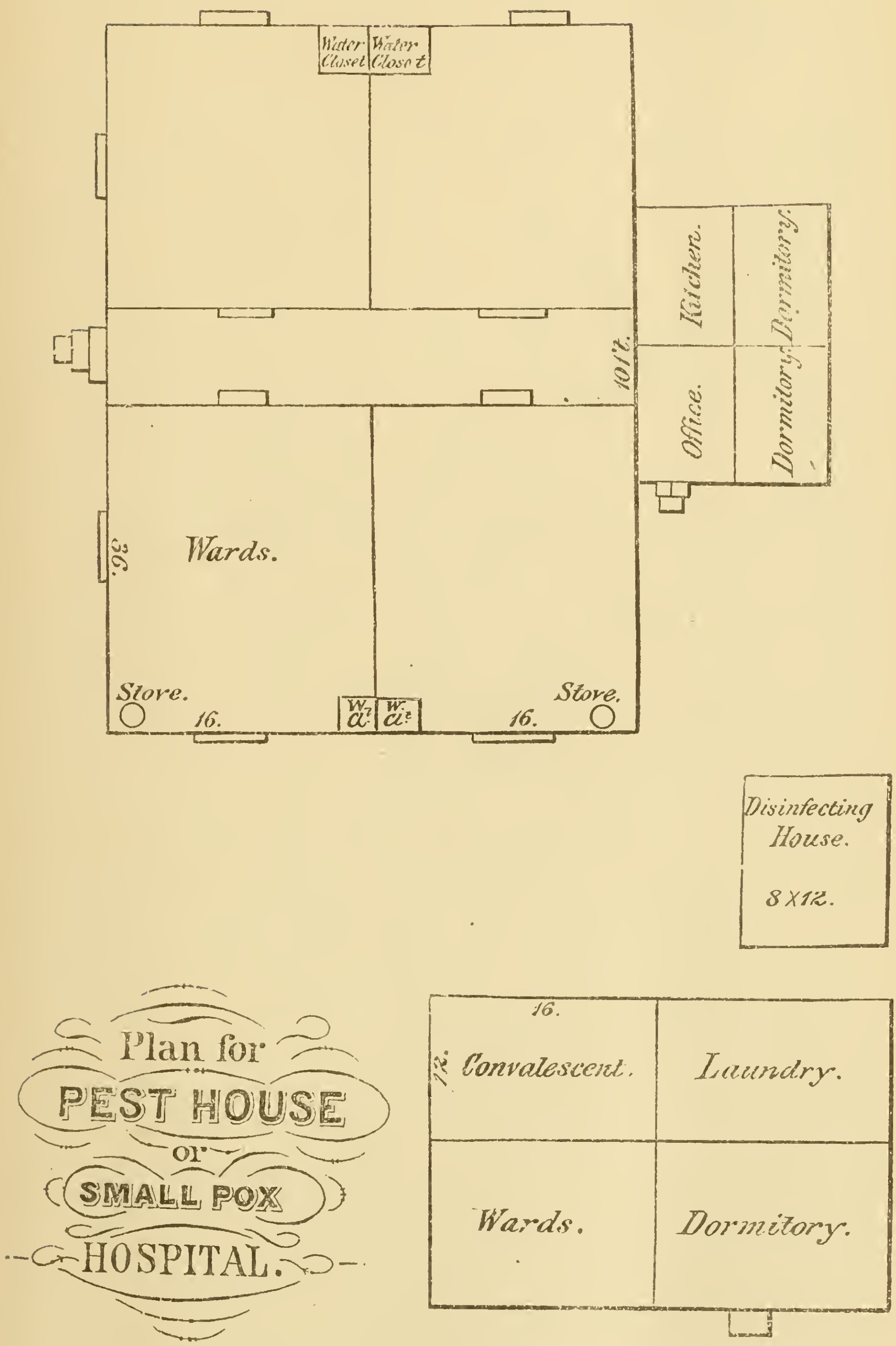
Sulphate of iron $1\frac{1}{2}$ pounds to a gallon of water. This should be placed in all vessels used to receive the discharge from the patient, and poured down sewers, privy-vaults, etc. Chloride of lime and carbolic acid are not recommended. In case of death, the body should be wrapped in a sheet dipped in a zinc solution of double the strength of the above, and buried at once.

Chloride of zinc, one part (Burnett's Fluid,) to 200 of water, destroys all bacteria and may be used for woodwork or for linen and cotton goods.

PEST-HOUSE.

This should be of one story only. On the plan there are four wards, separated by an entry through the middle of the building. Opposite this is an ell containing an office or reception-room and dormitories for the attendants. If stoves are used to heat the wards, a ventilating-shaft may be run near the chimney, terminating in a cowl or similar arrangement. The wards should be thoroughly ventilated, the method varying with the method of heating.

Near by a disinfecting chamber may be built to disinfect bedding, etc., by sulphur. This is almost indispensable, as here the bedding cannot be destroyed after each case. Beyond this is a convalescent ward, and a laundry and diet kitchen with dormitories. This makes a complete establishment. Where the number of patients is likely to be small, the first building may be adapted for all uses by a little modification. Two of the rooms on one side may be used as wards, one on the other side as a convalescent ward, and the other as office and reception-room. The rooms in the ell might then be used—one as kitchen and laundry combined, the others as dormitories for attendants. In many cases several neighboring towns might combine and use such a building jointly, as cottage hospitals are managed in England, where large establishments are impossible. This plan provides for complete isolation of patients and attendants, supplies having been laid in previously. Iron bedsteads and wire matresses that can be painted, and thus easily washed and cleansed, are the best. The laundry should be provided with a set kettle for boiling clothing in the disinfecting solution.



Plan for
PEST HOUSE
or
SMALL POX
HOSPITAL.

ADULTERATION OF MILK.

In many instances we have been called upon to examine specimens of milk where adulteration was suspected, or where the milk used as food for infants was not digested, and did not appear to nourish. In quite a number of cases the milk was clearly adulterated; the closest imitation found was where a dilute mixture of starch and water was added to the milk in large quantities, the specific gravity being preserved. Some substance of a mucilaginous nature was also added in very small proportion to prevent the starch from settling; in spite of this on long standing the lower portions of the milk were thicker than the upper. This was not very noticeable however, until the second day, it being supposed that the whole quantity would be used for one day's supply, which in fact was the rule. This thickening was not very apparent unless the milk were placed in a glass bottle. The lactometer here would be useless, as the same specific gravity is preserved. Infants cannot digest starchy foods until they are old enough for a mixed diet, and their ability is in inverse ratio to their age, that is, the younger the child, the less power has it to digest starch. As artificial feeding of infants is so largely depended upon, especially in cities and towns, the importance of this adulteration is very great. The milk is thus robbed of its health and life-giving properties, and so much rubbish added which the comparatively weak organs of the child are called upon to get rid of, and as a natural consequence diarrhœal troubles ensue, the starch acting as an irritating foreign matter. As the milk for young infants is largely diluted with water before it is used, the importance of pure milk to start with is correspondingly increased. In several instances where the milk was said to disagree, this starchy admixture was detected. The milk can easily be tested for starch if a drug store is accessible, or in the country every physician would probably have the materials. Place an ounce or two in a tin cup, boil a few minutes gently, then transfer to a glass tumbler previously warmed, add a few drops of muriatic acid (any strong acid will answer), stir, strain, and cool, add to the whey two or three drops of the simple tincture of iodine; if there be any starch present a deep, blue color will appear. The acid sets the iodine free, which unites with the starch to form the blue color.

The adulterants used are quite numerous, between ten and fifty

per cent. of water it is estimated is often added to milk; in this way the milk often becomes infected with the germs or virus of typhoid fever and other zymotic diseases; the instances are only too common. Prof. Chandler estimates from numerous investigations that to the milk sold in New York one-quarter water is added. In many instances all the families supplied by a certain milkman have been attacked with typhoid fever, as near Glasgow, Scotland, in 1872–3, and in the suburbs of London 500 cases were thus caused. Diphtheria also has been thus distributed. Chalk, flour, and various decoctions as of barley, for instance, are largely used, sugar and gum arabic, salt and various coloring matters, gelatine and isinglass, to thicken and preserve the specific gravity. The most peculiar adulterants *said* to be used are the brains of domestic animals pounded fine, thinned with water; the latter we have never seen,—instances are given, however.

The microscope here becomes a valuable aid in detecting many of the foreign substances, also in determining the relative richness of the milk. Even if the adulterants are not identified by it, there is no known method by which the fatty corpuscles or globules in the milk can be imitated, and if these are very much decreased, the milk can be declared thin and poor, unfit for the nourishment of infants. The specific gravity is not a reliable test, as most milkmen who adulterate milk have a lactometer and bring the milk up to the standard of pure milk which should never be below 1,029, at 60° (Fahrenheit) temperature. With ordinary samples of pure milk more than ten per cent. of water can be added before the specific gravity is reduced below 1,029, as shown by Prof. Chandler's investigations.

Chalk can be detected by adding water to the suspected milk, placing it in a test-tube or glass bottle, and allowing it to stand awhile. The chalk will settle. Carefully decant, then add a little muriatic acid to the sediment—effervescence shows the presence of chalk. Flour and starchy decoctions can be detected in the manner already described for starch. The other substances require more complicated tests. Water, which is by far the most commonly used, is most difficult of detection unless it exceeds a certain amount; except as before indicated it is harmless, the only other detriment being the impoverishment of the milk, and the reduction of its nutritious value. The principal adulterations found have been starch, lime-water, chalk, flour, various gums, bicarbonate of soda and salt, and, of course, water. The use of these, for-

tunately, is not common in this State—perhaps we must except water in this statement—but it is well to know how to detect those most ordinarily met with.

ADULTERATION OF FOODS.

The work in this department is not yet complete. It can, however, be said that while no doubt adulterations do exist, they are not found in anything like the alarming proportions stated by sensational writers. The greater portion of those found moreover, are of a harmless nature, and are substitutions of a cheaper substance for one more expensive, as turnip grated for horse-radish, meal for mustard. The ground coffee is in many cases known to be a mixture; the adulterants are usually harmless; the only danger in using rye is, of an admixture of ergot—instances, not in this country however, have been given of sickness thus caused. The various matters that are used in the manufacture of candies are not all of them harmless, nor is the terra alba used in the cheaper grades of chocolate creams and the like, recommended as an aid to digestion. Large quantities of glucose syrups are sold and glucose sugars; the only detriment is they are not as sweet as the sugar cane syrups. Sorghum syrup is largest glucose, but has never been considered unwholesome. The law passed at the last session concerning the sale of glucose is entirely uncalled for. Fortunately no attempt has ever been made to enforce it. It should, however, at once be repealed, as it might be used maliciously. The sensational reports concerning tin in sugar and syrup have never been shown to have any basis in fact, by the tests we have made.

DOMESTIC POISONS.

Repeated instances have been brought to notice of sickness resulting from the use of arsenic in various trades and manufactures. In places where the arsenic is liable to be diffused as a fine dust, it is advised that some form of respirator be used; the respirator vail of Dr. Browne is light and easily worn. Of course, in work in-doors, the only portion used would be that covering the mouth and nose.

Lead-poisoning, from the use of lead pipes to convey spring water long distances, is occasionally seen. The use of galvanized-iron pipes can be safely recommended, as the most careful study has failed to show any dangers from zinc-poisoning, which was urged as an objection to their use. Where the fumes of lead are

to be encountered, the use of a respirator is also advised, as well as a hood with a heated pipe opening into the air outside the building, to convey away the fumes. The use of melted lead in tempering steel, etc., is quite extensive in this State; unless careful precautions are taken lead-poisoning invariably occurs sooner or later. The danger to workers in rubber from this source is described by Dr. Bartlett, and the precautions to be used. Several cases of poisoning from copper, resulting from the careless use of acids in connection with brass utensils, have been reported. Usually the compounds of the fruit-acids with copper are so astringent that their presence is at once detected; rarely except in the case of pickles, perhaps, is danger to be apprehended from this source. In lead-poisoning the cases of sickness resulting from the use of canned goods where the acids, etc., had acted upon the lead of the solder, in one instance a large lump had fallen into the can, and was thus directly exposed to such action. For the most part, the utmost care is shown by the manufacturers of such goods to prevent any such accidents; too great care, however, cannot be exercised.

SPECIAL INVESTIGATIONS.

Reports of these will be found in more extended papers later. In many instances dwelling-houses and some institutions have been examined. One peculiar defect is worthy of notice, as sickness of a typhoid character had been very prevalent; similar defects have also been found in private houses. On the first-floor in the center of a long narrow hall from which opened sitting and sleeping rooms, was a water-closet, trapped, of course, but the soil-pipe unventilated; through this closet passed a large tin pipe from the furnace conveying heat to the rooms above; the register-box as usual, larger than the pipe, ventilated this water closet, which was often used, into the room above. This room was used by children during six to eight hours of the day; bad odors had often been complained of by the occupants, but, as usual, no effort was made to trace them. The closet was ordered to be removed and in its new place the soil-pipe ventilated. Too often we find long waste-pipes running nearly horizontally, and often along the course of hot-air pipes, or beside furnaces, so the air in them is constantly rarified, and an upward draft induced.

Another sanitary defect worthy of note that has resulted from these special investigations, is as follows: Nearly all the waste of a large institution was carried to a large pit outside the main

walls—the laundry and kitchen waste, and that from the water-closets used by several hundred inmates. This was trapped as the man-holes by the sides of the streets are trapped. It was, however, closed hermetically, and of course constantly filled with the vilest gases of decay, as there was a sediment several inches deep at the bottom. As the air was here confined, whenever there was a large admission of wash into the pit, the foul air was forced through the traps into the buildings. This was ordered to be ventilated by a six-inch shaft running to the roof, and surmounted by a cowl; shortly afterwards in repairing the roof on washing-day, the workman stated that the steam could be seen pouring out of this pipe, and the odor was distinguishable several feet distant—good proof of its work as a ventilator.

SCHOOL HYGIENE.

Attention is here called to the valuable report of Mr. Robt. Briggs of Philadelphia, which discusses the whole subject of the ventilation of school-houses. As but few copies of this were printed, as well as from its intrinsic merits, we determined to republish the whole report, and our thanks are due to the author for his kind permission. As so many points of detail in the sanitary construction of school-houses were included here, we asked the architect of the new high school building, Mr. W. Richard Briggs of Bridgeport, to write out in full, a description of the plans, and for illustrations to accompany it; the paper discusses wisely and well many points in the sanitary construction of school-houses, and will be of permanent value.

TENANTS.

The following card furnished by the Dime Savings Bank of Norwich to all their tenants, is printed, as illustrating the interest in sanitary work in this State:

Compliments of Dime Savings Bank of Norwich—Tenants who wish Healthy Houses will please read, and follow these hints.

Water and fresh air are the chief defense against disease. Whatever else may be applied to unclean things, infected clothing, foul places or unhealthy houses, these two purifiers must be so applied as to make every part clean and fresh. Boiling water and strong currents of air will speedily remove all mouldy, slimy, and musty conditions and bad odors that are common in houses, closets, etc. The scalding water may be applied with a stiff wiper

or mop, and the currents of fresh air should be so turned on through open doors and windows as to ventilate through and through.

Wet cellars, damp rooms, and all dark places will breed mould and fungus growths, which make the air offensive and unhealthful. The remedies are: Light, air, and thorough drying.

Let there be the least possible waste and garbage, yet it is easy, with the help of disinfectants, to keep all kinds of refuse matter in such manner that it will not be offensive before its removal. For want of a little care many a valuable life has been lost through the putrid emanations of a few vegetable or animal matters in cellars and store-rooms. Even decaying wood and sawdust are very unwholsome.

Disinfectants are not substitutes for cleanliness and the use of water, light, and air; but they are useful for things and places which cannot be at once cleansed and ventilated so thoroughly as to prevent decay, disease, and infection.

The following simple rules will be found useful and inexpensive:

1. To absorb moisture and putrid fluids, use fresh stone lime finely broken; sprinkle it on the place to be dried, and in damp rooms place a number of plates or pans filled with the lime powder. To absorb putrid gases, charcoal, fresh and dry, should be combined with the lime; this is the calx powder sold in shops, but any one can easily prepare it.

2. To destroy putrid effluvia and to stop putrefaction, use chloride of lime, as lime is used in the above. Occasionally pour upon the plates some strong vinegar and add more of the chloride.

3. To disinfect privies, cess-pools, drains, and especially vessels and places in which refuse or discharges from the sick are cast away, use copperas—dissolve ten pounds of copperas in five gallons of water, stirring it briskly to make a complete solution. Pour a pint of this solution every evening into every water-closet, pan, or privy-seat, and rinse out every receptacle for swill. To disinfect masses of filth, privies, cess-pools, etc., gradually pour in the solution hour by hour till every part of the mass or foul surface has been thoroughly disinfected. Let a small quantity of this solution be constantly kept in all vessels into which the discharges from the sick are voided, and let every privy or place where the discharges are cast away be thoroughly saturated with the disinfecting fluid. The above solution is still more effective if a pint

of the very best fluid carbolic acid is added; but this is somewhat expensive and has a strong odor.

4. To disinfect clothing, use a solution of four ounces of sulphate of zinc and two of common salt in a gallon of water. All clothing from the sick should be packed in this solution till it is boiled in the wash. The solution is colorless, and produces no stain.

This is not printed because all its recommendations are endorsed, but for the reasons before stated. Chloride of lime and carbolic acid are not recommended as disinfectants, they are both offensive, and the latter useless, unless very much stronger than can be conveniently used.

TOPOGRAPHICAL MAP OF THE STATE.

In studying the local causes of diseases, the need of accurate knowledge of the topography of the region is keenly felt. As far as our limited resources permit, we endeavor to supply this deficiency. A measure for a survey of the State was introduced at the last session and continued to this, where it is most earnestly hoped it will meet favorable consideration. The work will be of permanent value in many other aspects besides the sanitary one; indeed it is strange that the work has been delayed so long.

DISEASES OF DOMESTIC ANIMALS.

The importance of diseases in domestic animals is beginning to be generally recognized, but as yet no action commensurate with the necessities of the case has been taken. The discrimination against American exports has aroused tardy attention to the subject of the preservation of health in domestic animals, and the prevention of disease. It is, however, with those diseases that are communicable to man, that we, as sanitarians, are more directly interested in, while appreciating the gravity of the whole subject. As will be seen by the accompanying registration report, a death from glanders, communicated from animal to man, occurred in Waterbury. The horrible features of this disease when thus communicated, and its incurability, renders every means for its suppression desirable. Direct power to kill all infected animals should be given to the Cattle Commissioners, and provisions made for immediate burial and slashing the skin of the animal, to render it worthless, and prevent its becoming in turn an agent for the spread of disease. The protection of uninfected stock, and

the importance of stamping out the disease at once, demand prompt, decisive action, as would be taken in cases of venomous reptiles. The list of communicable diseases is somewhat formidable—some of the most important are as follows:

Glanders and farcy in horses, etc.

Rabies in dogs and cats, etc.

Malignant anthrax in all domestic animals.

Tuberculosis in all domestic animals.

Small pox in chickens and pigeons.

Trichinosis in swine, and other parasites.

Favus in cats, etc. (*Tinea favosa.*)

Tape-worm in cattle, sheep, etc.

Malignant pustule (*anthrax*), is not very common in this country, but unrecognized cases in butchers, tanners, and others exposed to this contagion, doubtless occur. The symptoms of several obscure deaths that have been recounted, strongly favor this supposition. In San Domingo, 15,000 men died in six weeks from eating beef thus diseased. Fortunately, this disease is extremely rare. Tuberclosis is discussed in the essay of Dr. Cressy, to which particular attention is directed. It is a singular fact that in some parts of Europe, small pox is so common in pigeons and poultry as to be a nuisance. As yet no reports have been made in this country. The importance of trichiniasis is generally understood; fortunately, thorough cooking destroys this parasite. The field for study in this somewhat unknown field is large, and the results promising, in illustration of the causation of disease. The report of Prof. Law to the National Board of Health discusses this subject very fully in the Bulletin of July 24, 1880.

VISUAL POWER AND COLOR-BLINDNESS.

Reference has already been made to the color-blind law. The following is the detailed history of the examinations, except the results, which will be found in the reports of the examiners. The following letter of inquiry was addressed to the President of every railroad in the State, and every facility was afforded, without exception, either as detailed in the letter, or in some manner as satisfactory. The succeeding documents explain themselves. The testimony is that of men, for the most part, prominently connected with railroad interests, who came either voluntarily or otherwise on the part of the employees. No witnesses were summoned by the Board. The argument of Judge Wright was upon the interpretation or construction of the law, and many of the points were afterwards used by witnesses, or contained in papers subsequently submitted, so it is not given here. The general interest in this and other States on the subject, induces the publication of the stenographic report in full.

Dear Sir:—In accordance with an act of the last legislature, we have nominated two experts to examine railroad employees for acuteness of vision and color-blindness. Before making final rules we desire to learn from all the railroads what facilities can be obtained to render the execution of the law as easy as possible. What we especially desire is free transportation for the examiners, who work singly, whenever engaged in this work. Also such clerical aid in filling out the certificates with name, age, and description of employee, either before the examination commences or while in progress, as shall expedite business. The use of an old passenger-car is a convenience, and attached to the pay-car when possible.

By order of the Board,

C. W. CHAMBERLAIN, *Secretary.*

The following is the circular of instruction containing the law and the rules of the Board.

ACT OF LEGISLATURE REQUIRING EXAMINATIONS.—RULES AND REQUIREMENTS OF THE STATE BOARD OF HEALTH.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. The State Board of Health shall prepare rules and regulations for the examination and re-examination of railroad employees in regard to color-blindness and visual power, prescribing the method in which, and the intervals at which, such examinations shall be made, the maximum fee to be charged for each examination, the form of certificate to be issued by the examiners, and such other regulations as said board may deem necessary. Said board shall send a copy of such rules and regulations to every railroad company and trustee operating a railroad in this State, on or before the first day of July, 1880. Said board may from time to time make such changes in said rules and regulations as they may deem best, and communicate the same to said companies and trustees. Said board shall annually, in the month of May, recommend two or more medical experts to make the examinations above referred to, and the Governor shall annually, on or before the first day of July, appoint not less than two medical experts, any one of whom shall be authorized to conduct the examination for color-blindness and visual powers, and issue certificates in accordance with the rules of the Board of Health.

SEC. 2. On or before the first day of October, 1880, every railroad company and trustee operating any railroad in this State shall cause every person in their employ as locomotive engineer or fireman, train conductor or brakeman, station agent, switchman, flagman, gate-tender, or signalman to be examined at the expense of the railroad company by one of the examiners to be appointed by the Governor in regard to color-blindness and visual power, and shall cause a like examination to be made of all persons employed after said date in either of the capacities named above, and shall cause re-examinations to be made in accordance with the rules prescribed by the Board of Health.

SEC. 3. Any railroad company or trustee operating any railroad in this State employing, after the first day of October next, in any of the capacities specified in the second section of this act, any person who does not possess a certificate of freedom from color-blindness and possession of normal visual power, duly issued in accordance with the provisions of this act, or knowingly employing in any of such capacities any person whose certificate has been revoked by the examiners, shall for each and every offense be punished by a fine of not less than two hundred nor more than one thousand dollars.

Approved, March 25, 1880.

RULES FOR EXAMINATION OF RAILROAD EMPLOYEES UNDER PRECEDING ACT.

Rule 1. All Railroad Employees requiring examination under the law of March 25, 1880, shall be divided into two general classes.

Class First shall include Engineers, Firemen, and Brakemen.

Class Second shall include Train Conductors, Station Agents, Switchmen, Flagmen, Gate-tenders, and Signalmen.

Rule 2. Certificates shall be given for each position in accordance with the succeeding rules for examination. Promotion from one class to the other requires re-examination and certificate.

Rule 3. Re-examinations shall be made: 1st, after any disease of the eyes; 2d, after injuries affecting the head or eyes; 3d, after any disease or trouble of the brain, and after long-continued illness, as typhoid fever; 4th, after mistakes or acts which call in question the visual powers; also, whenever directed by the Board of Health.

Rule 4. The examiners shall report regularly to the State Board of Health, and their work shall at any time be open to the inspection of any member or members of said Board.

Rule 5. The regulations for conducting the examinations and the standards for each class shall be determined by the Board of Health, and not by the examiners. New rules and regulations shall be adopted from time to time as required, and alterations and amendments made.

Rules for Conducting Examinations.

Rule 1. For the *qualitative* estimation of color-blindness the following tests are to be employed: Holmgren's Worsteds, the Tables of Stilling Donder's Color Test Patterns, Pflüger's Letters with Tissue Papers, Däac tests and Woinow's Revolving Cards may also be used.

For the *quantitative* test for color-blindness, Donder's Reflected Spots, Donder's Method with Transmitted Light, Holmgren's Shadow Tests shall be employed.

Rule 2. The following are the requirements for a certificate in the first class:

1. Healthy eyes and eyelids without habitual congestion or inflammation.
2. Unobstructed visual field.
3. Normal visual acuteness.
4. Freedom from color-blindness.
5. Entire absence of cataract or other progressive disease of the eyes.

The second class shall have:

1. Healthy eyes and eyelids without habitual congestion or inflammation.

2. Unobstructed visual field.

3. Visual acuteness at least equal to $\frac{3}{5}$ without glasses and normal with glasses in one eye, and at least $\frac{1}{2}$ in the other eye with glasses.

4. Freedom from color-blindness in one eye, color-perception at least equal to $\frac{3}{4}$ in the other eye.

RULE 3. In the case of employees who have held their positions five years or more, the standards required in each class shall be determined under special instructions from the Board of Health.

AUGUST 25, 1880.

The following rules and instructions have been added to the printed rules for examination of railroad employees for visual acuteness and color perception, since their publication.

RULE 1. Brakemen shall be transferred to Class Second.

RULE 2. The certificates shall be retained until all on a given road, or within a certain vicinity, have been examined, and then distributed by the railroad officials.

The blanks after "find that is" shall be filled by "sufficient under the rules of the Board" in *all* certificates granted. Those that fail to pass the tests for color-blindness shall be at once informed as privately as may be, and re-examined at the convenience of the examiner as hereafter provided. Care shall be taken to make the employees rejected understand all their chances under the rules.

The following instructions under this rule have also been issued;

1. The standard for visual acuteness shall be two-thirds instead of $\frac{20}{20}$ (twenty-twentieths).

2. Engineers with a vision of $\frac{20}{20}$ in one eye, and $\frac{1}{3}$ in the other, with no progressive disease of either eyes, and sufficient color-perception shall be granted First Class certificates.

3. Those failing in the tests for color-perception (Rule 1st, page 6) shall be tested by flags and lanterns at a distance of 80 rods. New and old flags are to be used, and such flags and lanterns as are used for making signals on the road in question. The examiner shall satisfy himself that the employee can distinguish colors correctly.

By order State Board of Health,

Attest, C. W. CHAMBERLAIN, M. D., *Secretary.*

Connecticut is a pioneer in this work in this country, being the first State to pass a law requiring examination of all railroad employees engaged in moving trains. The standards adopted are for the most part those agreed upon at the International Medical Congress at Amsterdam, September, 1879.

The following is the form of certificate. These are bound in books, the stubs retained for reference and tabulations. The form of regular returns by the examiners to the Board follow.

STATE OF CONNECTICUT,

No. STATE BOARD OF HEALTH, BUREAU OF VITAL STATISTICS.

CERTIFICATE OF EXAMINATION FOR VISUAL POWER AND COLOR-BLINDNESS.

This may certify that I have this day tested carefully the VISUAL POWER *of* *whose signature is attached to this certificate, and find that it is* *I have also tested his* COLOR-PERCEPTION, *and find that it is* *He is, in these respects, fitted for the position of*

Given in presence of the Examiner.

Examining Ophthalmic Surgeon.

18 .

Signature of party examined.

STUB ACCOMPANYING CERTIFICATE AND RETAINED BY THE EXAMINER.

No.

Name, ; Age, ; Height, ; Complexion, ; Occupation, ; Vision, ; Color Perception, ; Railroad, .

Examining Surgeon.

POSTAL CARD REPORT FROM THE EXAMINERS.

18 .

Report for week ending 18 .

Number in Class First examined, - - - - - -	———
Number in Class Second examined, - - - - -	———
Total, - - - - - - - - -	———
Number with incomplete color-sense, - - - - -	———
Number with complete color-blindness, - - - -	———
Number with defective visual power, - - - - -	———

Connected with which Railroads,

The following is the letter requesting a hearing by the employees, through their attorney.

New Haven, Conn., August 5, 1880.

C. W. Chamberlain,

Secretary State Board of Health, Hartford, Conn.

Sir: I have before me a petition to the State Board of Health, a copy of the heading of which I herewith inclose—signed by about two thousand men, to wit, by presidents, ex-presidents, superintendents, conductors, engineers, brakemen, flagmen, station agents, and other employees of all the railroads in this State, and by other citizens.

They have instructed me, as their attorney, through a committee who have their interests in charge, to request through you as Secretary that said Board be convened as soon as practicable, so that they may have a hearing upon said petition.

They would be glad to have the meeting called in this city, as more central than any other place in the State for all parties in interest; and to facilitate matters, they offer to the Board the use of Brewster's Hall in this city, corner of Chapel and State streets, as a place of meeting.

They also request the Board to convene on Thursday of next week, August 12th, at 10 A. M., if such time will be convenient for them; if not, then at the earliest possible time thereafter.

As the petitioners will need a little time to procure the presence of interested parties, after they know the time and place of meeting, will you oblige me with an early reply to this letter, stating whether the Board can be convened at the time and place mentioned, and if not when and at what other place, at their earliest convenience.

I am, truly and respectfully,

D. R. WRIGHT,

Attorney for Petitioners.

At the second meeting the following papers were presented:

New Haven, Conn., August 16, 1880.

To the Honorable State Board of Health:

Gentlemen: Inclosed please find the rules for the examination of railroad employees, which my clients desire your Board to adopt, and which you requested me to draft and submit for your consideration.

We think the law is wholly unnecessary, and that the public is safer without the law than with it; that the science of color-blindness (if indeed it may yet be called a science), is at least in its infancy; that there is in no State or nation a legally-tabulated set of rules in force as

a test for the existence of color-blindness except in Holland, and those differ very much from the ones now in use by the State Board of Health; and that the application of the tests adopted by the Board is not such as to increase the safety of travel, but on the contrary are unjust in their operation to the railroad employees.

The tuition and trial of railroad employees in a practical way by the officers of railroads, during a long period of time before they are promoted to responsible stations, are of themselves a sufficient guarantee of safety to the traveling public; especially when the interest, the responsibility, the property, and profit of railroad corporations all combine to have none but competent persons employed.

The law is also crude in its provisions, uncertain as to some of its enactments, and might with propriety be suspended in its operation till the next session of the General Assembly, so as to be made by amendment more practical and just, instead of being used, as it must necessarily be as it now stands, only for the purpose of gathering statistics for the development of a supposed science still in embryo, by subjecting a meritorious class of workingmen to be experimented upon. Nevertheless, we do not ask for such suspension of the law, but desire that it shall be executed in a manner just to the employees and safe to the public, and both of these ends may be secured by making all examinations practical in the manner provided by the rules submitted.

In order to expedite the work, and to provide a way of sifting out the deficient ones, the third rule is introduced, providing for a preliminary examination.

We submit schedule "A," appended to the rules, as containiug reasonable suggestions as to the tests that might be used, and the circumstances under which they might be applied; but we do not ask that said schedule "A" shall be adopted as a rule. I shall send a duplicate of this letter, said rules and said schedule "A," both to the Secretary and to Mr. Burr, so that they may the more surely be received by the one in the absence of the other.

I would like to be notified of the time and place, when and where the Board will next convene, which I trust will be soon, so that myself and the Chairman of the Committee of Employees may be present, to answer any questions or make further suggestions.

I am respectfully,

DEXTER R. WRIGHT,

Attorney for R. R. Employees.

RULES SUBMITTED BY RAILROAD EMPLOYEES TO THE STATE BOARD OF HEALTH FOR ADOPTION.

Rule 1. All railroad employees required to be examined under the law of March 25, 1880, shall be subjected to the same practical tests as they are subjected to in the course of their employment, and not to fanciful or theoretical tests.

Rule 2. All examinations for detecting color-blindness and ascertaining the visual power shall be conducted with such flags, lights, and other signals only as shall conform in all respects, as nearly as practicable, to those *in actual use* by the railroads of this State; and all examinations shall be made under the same circumstances, so far as practicable, as those that occur in the actual operation of said railroads.

Rule 3. As only a small percentage of those to be examined are color-blind or have defective vision, no objection is made to a preliminary examination *with the same tests* as those mentioned in rule second, and under circumstances varied from those specified therein, to suit the convenience of the examiner, and secure dispatch in making examinations. But if such preliminary examination shall give rise to a suspicion that the employee is color-blind or has defective vision, in any degree, he shall be subjected to the full test provided for in said rule second.

Rule 4. In granting certificates, the success and experience of the employee, during the time he has been engaged in railroad service, shall be duly considered.

Rule 5. All rules and regulations of the State Board of Health inconsistent with these rules are repealed.

SCHEDULE "A." BEING SUGGESTIONS.

Signals to be used may be red, white, and green flags and lights.

TESTS FOR SUPPOSED COLOR-BLINDNESS.

The applicant shall be able to distinguish the flags, one from the other; also lights, the one from the other. In this test distance is not to be regarded.

TEST FOR VISUAL POWER.

A red or white flag displayed 80 rods off. In this test, the flag to be used or waved with energy and rapidity, in the same manner as a person would use it *to flag* an approaching train.

A green flag being used only as a train-signal, distance is not material.

Signals same as at masthead of drawbridge by day or night, 150 rods off.

Red, white, and green lights by night, 100 rods off.

Switch targets by day, same distance as flags: to wit, 80 rods off. Tests to be made under fair conditions of atmosphere.

STENOGRAPHIC REPORT OF TESTIMONY.

GEORGE H. WATROUS, Esq., President of the N. Y., N. H. & H. Railroad, spoke as follows:

Mr. President and Gentlemen:

Upon looking at this question I am a little surprised, I confess, that it should be claimed there is any meaning attaching to the word "normal" in the third section of the Act which is not to be gleaned in substance from the two preceding sections. "Normal" doubtless sometimes has a technical meaning, but it may be absolute or relative. There is nothing said about any particular *grade* of visual power; but doubtless a crude way of arriving at the subject-matter must have been had in mind. Is not the "normal visual power" referred to that kind of visual power requisite for the person in whose behalf a certificate is issued, to perform the duties to guard against the dangers of which this law was passed? Is not that the rational meaning of the word "normal"—meaning *proper* visual power? They should discover the kind of visual power required; for it must be assumed, I am sure, that the Legislature intended to guard against what they conceived to be a *real*, not an imaginary, danger. They intended that you should adopt such measures as would guard the public against the danger of having trains managed by men who cannot discern the signals. That result accomplished, you have gone as far as the Legislature obviously intended you should go. It was not intended that you should make these men experts in color, or that you should educate them for some other calling. To increase the safety of travelers I take it to be the manifest object, and any resources that will reasonably conduce to that end ought to be insisted upon. I remember when it was almost thought to involve the necessity of writing a will to take a long journey by railroad. Curious statisticians have collected data showing that the safest place on earth is on a moving train, under existing management.

Now when you have adopted a rule that engineers shall discern and distinguish the signals, that was as far as it was intended you should go. That is all I have to say about the meaning of the statute.

We have some 80,000 miles of railroad and not an accident has arisen from this cause. I suggest that you lay the law quietly aside when you discover that by enforcing it (in the adoption of such rules as you have adopted) you work out these two results—injury to the employees, and to the companies. I fear these results might ensue. I am not here as counsel; I am here as a friend of our employees and of our company. I fear, in the first place, that the application of these rules *may* work injustice to worthy men. I fear that we ourselves have got some men who, though able to tell red and green and white as unerringly as any one, nevertheless would be puzzled by the nomenclature of colors and shades of colors. If they can tell red and white and green it is not of the slightest consequence, so far as their duties are concerned, whether they can distinguish shades of greenish yellow. I am afraid there may be some who

are deficient in these respects. I do not want to see those men who take their lives in their hands, who spend so many years in learning this perilous service that they really forget how to do anything else —to whom an engine is an inseparable companion—I do not want to see them thrown out.

But I also take the Company's interest into account. While we do not want a man in our service whose deficiency in any respect would imperil a passenger over our road, yet I am free to say, if we have a man who has successfully run our trains for many years, making his time, watching and obeying the signals, and carrying thousands of passengers safely, quickly, and comfortably—we do not want that man to be thrown out of our service because, forsooth, he cannot distinguish all shades and comply with these jaw-breaking tests. Bear in mind, I do not want a man who cannot distinguish the signals—red, white, and green—at the requisite distance; white meaning safety; green, caution; red, danger.

I do not want to be compelled to substitute for that experienced man a new man, no matter how good his optics, and have the responsibility of running that train down into New York. On *your* account I should say, "Keep the man we *know* we can trust, rather than take a new man who don't know the ins and outs of our road." If you insist that we shall dismiss the good man *we* are willing to trust, and take the untried men *you* are willing we should use, then I ask that you, the State, shall take the responsibility of running the trains, and if disaster ensues pay the bills.

[Mr. A. E. Burr, of the Board, stated that he had listened with much interest to the remarks of Mr. Watrous and the others, but that there was one particular point which had not been brought out, and he put this question:]

Q.—Suppose you have five *new* applicants for situations. They are tested by the colored worsteds and two of them fail to match the colors; three succeed. Which of them would you accept?

A.—I should certainly prefer the three who could distinguish the colors. I do not question the wisdom of these rules as a means of ascertaining whether or not a man is color-blind.

Mr. Burr.—Your old engineers have been granted certificates, even those whose vision was not perfect, having in mind their long experience. Our fifth rule requires that action. Our sympathies are with these men so long in your employ, and we have discriminated in their favor. It is a delicate question. But the *new* applicants have to be dealt with. Now, how far shall we go with them?

Mr. Watrous.— I should prefer that they be able to distinguish the colors and shades of colors. I would not take, nor permit the Supervisor of our Motive Power to take, a new man unacquainted with our road whom Dr. Carmalt said was absolutely color-blind.

Dr. Chamberlain.—Regarding the old employees. Would you be willing to trust to their power of determining the color by the *intensity*

of the light—which is the principal guide to the eye of a man who is color-blind?

Mr. Watrous.—We have an engineer of ten years' experience,—say on our New York Division, where are running thirty trains in and out daily (not including freight trains). If for ten years he has run on the railroad, going through 626 times a year, and has never failed to note the right signal under any circumstances, and has never had an accident attributable to failure to see, I should be very unwilling, under the sense of the responsibility upon my shoulders, to change that man for any new man on your endorsement.

Mr. Burr.—This man's training makes him a pretty safe engineer even if he be a little color-blind?

Mr. Watrous. Yes, sir. But if he were a *new* man I should reject him at once. We certainly want no one on our engines who would imperil the lives of our passengers.

Dr. Chamberlain.—Take the case of this man whom you have given, as an illustration: Let us change the *intensity* of the signal lights. If he fails correctly to distinguish them would you then wish to retain him?

Mr. Watrous.—I should have my doubts about it. I should be doubtful about retaining such a man.

By Mr. Lippitt of the Board.—Suppose that test was adopted: To tone down the lights and ascertain the perception of color by differing grades in intensity?

Mr. Watrous.—If you continue that process until you get a condition of things never to be met in his practice it would be unjust. If you reject a man simply because he is not free from color-blindness, in the scientific sense, you do the man a greater wrong than you do us.

Mr. Wright.—Would you employ the same reasoning regarding visual power as to color-blindness?

Mr. Watrous—By that I suppose you mean range or reach of vision. If a man is near-sighted, or for any cause cannot see the signal at the distance required for the safe running of the trains, I do not want him. But if he can discern the signals unerringly every time at such distance as he is *required* to, and for thirty years has done so, I should be rather unwilling to reject that man because he could not see double the required distance. Ordinary passenger trains can be stopped with the Westinghouse brakes within 300 to 500 feet. Eighty rods is as far as any railroad regulations require a signal to be discerned; that is, safety is secured if the object is discerned 80 rods off.

Mr. Lippitt.—Is it any part of the *conductor's* requirements to know the signals?

Mr. Watrous.—It is to this extent: The conductor, under our rules, must see that the "draw-signals" are right every time before the train starts. The engineer cannot start the train until they *both* see the signal.

Dr. Lindsley of the Board.—Are our rules and regulations, in your opinion, too exacting and severe for your present employees?

Mr. Watrous.—We feel more sensitive about our *engineers.* A good engineer of experience on the road, and otherwise right, is a pretty desirable employee. The best engineer on another large road could not run an engine on our road without first learning it [the road] thoroughly.

Dr. Lindsley.—Ought they not, when you begin to train them, have good vision?

Mr. Watrous.—The engineer starts as a fireman; or perhaps, he comes out of the shop. But even then he "fires," frequently, before he takes an engine. So we possibly cannot take a new man.

Mr. Burr.—Have you any rule regarding the losing of eyesight by age, applicable to your men?

Mr. Watrous.—We have no established rule. If there is anything else for him to do, we give him that. We don't mean to turn him adrift.

Mr. Burr.—Would not the examination be worth something to you in that case?

Mr. Watrous.—To be frank, I think we are as capable of settling that question ourselves,—not for scientific purposes, but as to ability to discern signals.

Mr. Burr.—Have you officers to test them?

Mr. Watrous.—No, no special officers. It would be done by the Superintendent of Motive Power. I can see of course, that it *might* happen we should keep a man who could not discern the signals; but although the agitation of this subject is well enough, you have not any such interest in the matter as we have.

Mr. Burr.—Certainly not. But this duty was put upon us. I wish they had referred it to the Agricultural Board. There is not a member of this Board who would wish to make any arbitrary rules to the injury of your engineers or yourselves. We had nothing to do with the making of this law, which says it is necessary to examine these men. *You* have not selected any person to examine your employees for failing eyesight, when, say, fifty years old. The State has done so. Now, is that a wrong step for the State to take?

Mr. Watrous.—No, I would not dare to say that, sir. I do not want any men retained in service if they are unfit in this particular matter of vision. Whatever my feelings might be for the men I could not, either as a man, or an officer, afford to retain such. I am not here to plead for permission to retain an incompetent man one instant. A man whose vision I am in doubt about, I do not want. But if I have a man who can tell the signals we use, and has proved his ability by years of experience, I do not want to lose this man. I do not want *you* to lose him. We cannot afford to lose him to comply with any scientific tests.

Mr. Burr.—Do you think these tests are too rigid for *new* applicants?

Mr. Watrous.—They may not do any hurt as regards new applicants. Our chief cause of complaint is concerning the men actually in service. I think the tests in their case should be more practical.

Mr. *John H. Leeds* being called upon, after a few preliminary remarks, said:

I was waited upon by a delegation of engineers who came to me for sympathy and advice. Among them were men whom I started with in life, with whom I have been long associated, and I very naturally sympathize with them. I recommended them to get a hearing before this Board if possible.

The intent of the law I will not discuss further than to say that, while its spirit may have been good, the passage of the law in its present language was unnecessary, and its operations will work severe injustice to a large class of very worthy men. I plead in their behalf for a modification of these rules. I am an engineer myself, and was in active service about ten or eleven years, I think.

The first system of signals in these New England States I put up myself, and I have been familiar with the whole subject from its infancy. I travel a great deal upon the railroads, of course. I want to ride behind men who are tested with the implements they work with, and under the conditions they are obliged to use them—men who are selected by the officials of the road, and not by an appointee of the State.

Mr. Wright.—Suppose the men were tested in a long hall in daylight, with the red, white, and green flags; the hall darkened, and red, white, and green lights substituted. Would that be a practical test?

Mr. Leeds.—Well, yes, substantially.

Mr. Wright.—Suppose the same thing was repeated in a field with a range of 40 rods?

Mr. Leeds.—I would rather go upon the track.

Mr. Lippitt.—At what distance ought a person to be able, for safety, to see a red light?

Mr. Leeds.—I must qualify my answer. If the atmosphere is in a favorable condition, he can see his red light a mile away.

Mr. Lippitt.—Your answer then is, that he ought to be able to see a light in clear weather a mile ahead?

A.—Yes, with clear weather.

Mr. Lippitt.—Suppose he couldn't see it more than 300 feet distant?

Mr. Leeds.—If an engineer couldn't see a red light more than 300 feet under the same atmospheric conditions that another engineer could see it a mile, I should say he was disqualified.

Mr. Lippitt.—Suppose in misty weather the intensity of the light should be so modified that red should appear green to him, or *vice versa*, would he be a fit man to run a locomotive?

Mr. Leeds.—Well, under the same conditions, if the light appeared red to him when it was a green light, and he couldn't make anything else out of it, I should say he was disqualified.

Mr. Lippitt.—He would be unsafely color-blind?

Mr. Leeds.—He would. But the qualifications of an engineer other

than simple eyesight are so much more important, that, while this is the subject matter under consideration, yet under this present practice the most valuable engineers the world has ever produced would be disqualified.

Mr. Lippitt.—Do you think it wise or unwise, that persons new to the business should be tested?

Mr. Leeds.—Most certainly I approve that part of it.

Mr. Lippitt.—Would you put upon a locomotive any man who could not succeed in these tests?

Mr. Leeds.—I don't know as I can say about *these* tests. I would try a man with the practical tools of railroading.

Mr. Lippitt.—But if a man has demonstrated by a service of many years that he can discern the signals, you deem him safe?

Mr. Leeds.—I should, and for this reason, which covers the whole ground: no matter what the result of this test, I know that no engineer can for a single week safely run his train over the Consolidated Road, especially the New York division, particularly below the Harlem River, without proving his ability as a good engineer. If these tests show him to be absolutely color-blind, still there must be, I suppose, some conforming by nature in spite of weaknesses, so that he learns somehow to be a perfectly safe man.

Dr. Chamberlain.—Is not red *red*, whether in worsted or flags or lights?

Mr. Leeds.—Well, yes, substantially, as I understand it. But there are many other qualifications that go to make up a good engineer besides ability to distinguish these colors. There must be men in our service, I suppose, who are bordering on that age when they must retire on account of their eyesight; and to the proposition that there should be some practical test I take no exception. But it should not take men with nerve, brain, and experience. When you speak of throwing out such men it becomes a very serious matter both to railroad companies and to the employees themselves. It is impossible to run a train by sight alone. I would almost take the position that, as an engineer, I would rather lose my sight than to lose my hearing or my sense of smell or my intuitiveness. There are times when an engineer cannot see ten feet, I don't care how good his vision is. In frosty nights, when the engineer has run seventy-five miles with his head out of the cab window, his face becomes as white and bloodless as that paper. [Mr. Leeds related an incident confirming this.] We run in the darkest nights, in all kinds of stormy weather, or with the mercury at freezing. Of course eyesight is valuable, and I want them to have it, but it is not the all-important thing. You do not know the class of men you are going to throw out of service here. I have a right to plead for these men. Now, we very often hear of brave captains and seamen and generals, and so on. They *are* brave men. But I tell you there is no man or class of men equalling the true railroad man in bravery. You do not know the scenes of danger through which they have to pass. A sea-

captain may choose a favorable time to take his boat to sea; but with the engineer, when the pointer comes to the hour, he must go; no matter what the weather, or the danger, or the conditions surrounding him! The time must be made, and must be made in safety.

Mr. Burr.—This law confines us entirely to the question of sight. Whether the engineers have the other necessary qualifications, are temperate, etc., are questions not referred to us. We were not responsible for the law, and we have as much feeling for the railroad employees as yourselves. We would like to have you state, *in writing*, how you want these rules modified.

Now, in this connection, I wish to ask you this: If a man is partially color-blind and a little short in visual power, do you think he can train himself by practical work on the road, by observing the conditions of the light as to intensity, etc., so that he can overcome his visual defects?

Mr. Leeds.—That is my opinion; yes, sir.

Mr. Burr.—I want to ask another thing. Shall we deal entirely with the tools with which they work? For instance, why not take any object of a red color and request the applicant to match that, and if he puts a green color upon it, does not that prove his defective perception of colors? Is there such a difference as claimed between the rays of light from a lantern and from solid colors?

Mr. Leeds. I believe it is stated that color-blind persons can discriminate between colors from a transmitted light when they cannot with a reflected light.

Mr. Burr. But is not that test stated in my last question a fair test for a new man?

Mr. Leeds. In reply to that I will say, that what I should call a practical test—one to which I would be willing to have any apprentice subjected—is this: Let the young man be tested with the red, white, and and green flags that we use. Let him match those flags on the sticks where they belong. If he matches them correctly, that would be a practical test. If, however, he should put the red flag upon the green flag, and say they were alike, I should say there was a place for him in some other capacity.

Mr. Burr. Allow me to ask you if it is not well to have the best *eyes* as well as the best *car-wheels?* If the young man fails in the test with reflected rays of light, is there not a serious defect in his eyesight?

Mr. Leeds. I say *yes;* unqualifiedly, yes. But you do not comprehend exactly my motives when I allowed my sympathies to plead in behalf of the men. It was because these rules and regulations were too critical and too severe for men already operating railroads, and because they are going to work such widespread injustice to those men. It was that that led me to plead in their behalf, and to ask your sympathies and to ask you to make these rules and regulations conform to practical tests by the tools they work with, and under the conditions in which they work. [Mr. Leeds continued at some length, explaining the duties and perils of engineers, and reciting their experiences.]

REPORT OF DR. W. T. BACON,

EXAMINING OPHTHALMIC SURGEON.

To the Honorable State Board of Health:

Gentlemen,—I have the honor to transmit the report of examinations of such railroad employees as were assigned to me, in reference to their visual acuteness and color-perception under the rules and regulations adopted by your Honorable Body. Table No. 1 gives the number examined on each railroad, classified according to their occupations, and the number in each class. Table No. 2 shows the number in each class who are partially and completely color-blind, also the number having defective vision, with the per cent. of deficiencies. Table No. 3 states the number on each railroad found partially and completely color-blind, the number with defective vision, and the percentage of each defect.

TABLE No. I.

REPORT OF EXAMINATIONS OF RAILROAD EMPLOYEES FOR VIEW AND COLOR-PERCEPTION.

Number of Each Class Examined.	New York & New England.	N. York, N. Haven, & Hartford, Hartford Division.	New London & Northern.	Norwich & Worcester Division, N. Y. & N. E. R. R.	Conn. Western R. R.	Hartford & Conn. Valley R. R.	N. York, Providence, & Boston R. R.	South Manchester R. R.	Total.
Engineers, ...	42	32	14	22	9	11	24	1	160
Firemen, ...	47	36	10	21	10	8	24	1	157
Conductors, ...	32	20	8	10	6	6	17	1	100
Brakemen, ...	98	61	21	53	34	18	41	1	327
Switchmen, ...	12	32	12	6	5	4	19	. .	90
Station Agents, ...	26	16	10	9	20	12	3	1	97
Flagmen and all other Signalmen, ...	64	14	1	. .	14	. .	5	. .	98
Total, ...	326	211	76	121	98	59	133	5	1029

TABLE No. II.

SHOWING DEFECTS OF EACH CLASS OF EMPLOYEES.

Names of Each Class.	Red or Green Blind.	Defective Color-perception.	Vision less than Normal or 20-XXths.	Total Defection.	Per cent. of complete Color-blind.	Per cent. of defective Color-sense.	Per cent. of defective Vision.
Engineers, ...	3	1	10	14	1.8	.06	6.2
Firemen, ...	5	1	12	18	3.1	.06	7.6
Conductors, ...	3	. .	4	7	3.	. . .	4.
Brakemen, ...	12	7	30	49	3.6	2.1	9.2
Switchmen, ...	6	3	8	17	6.6	3.3	8.8
Station Agents, ...	2	1	10	13	2.	1.	.04
Flagmen and all others, .	4	. .	4	8	4.	. . .	4.
Total, ...	35	13	78	126	3.4	1.2	7.5

TABLE No. III.

STATEMENT OF DEFECTS FOUND ON EACH RAILROAD.

Names of Roads Examined.	Red or Green Blind.	Defective Color perception.	Defective Vision in one or both Eyes.	Per cent. of Color-Defects.	Per cent. of Visual Defect.
New York & New England, ...	12	5	25	5.	7.6
N. Y., N. H., & H., Hartf'd Division,	7	2	24	4.2	11.
New London & Northern, ...	1	. .	6	1.3	7.9
Norwich & Worcester Division, . . .	7	1	4	6.6	5.1
Connecticut Western, ...	1	3	10	4.	10.2
Hartford & Connecticut Valley, . . .	1	. .	2	1.7	3.3
New York, Providence & Boston, . .	5	2	7	5.3	5.3
South Manchester, ...	. .	. .	. .	. . . .	. . .
Of no road, ...	1	. .	. .	100.0	. . .
Total, ...	35	13	78	4.6	7.5

The whole number examined is one thousand and twenty-nine. Of these thirty-five were found more or less blind to red and green, and thirteen with defective color-perception, but able to recognize

red and green under ordinary circumstances. The methods used were Holmgren's Worsteds and Stilling's Plates for qualitative estimations of color-blindness. For the quantitative estimations, Donder's Reflected Spots were employed. Those failing to show satisfactory color-perception by the tests enumerated were tried with the flags and lanterns at 80 rods, one or both, in use on the road. Of the twenty-five color-blind to red or green, twenty-four appealed to the flags, and twenty-one of these failed in distinguishing red from green, while three named the colors correctly. In testing with the flags one of the officers of the road was always present, and his color-perception compared with the employees' and with mine. My experience with the flag test has convinced me that it is a wholly unreliable method for the detection of color-blindness, and may have a worse effect than if it had not been used, by giving to the color-blind,—who by some chance may have told the colors,—a false confidence which he did not before possess. Even those tested by it are not satisfied, as their failure is almost always attributed to some cause, as the light, want of sleep, etc. The three who called the colors correctly were quite blind to green by all the other tests used, and are in my opinion equally if not more dangerous than those unable to name the flags. Besides its unreliability, the tests with flags and lanterns is impracticable when a large number of men are to be tried, and I doubt if the employees of the roads in this State could have been tested by this method during the three months given by the law without great loss of time and inconvenience to the railroad companies. The method which especially commends itself is that of Holmgren's, and the more it is used, the better appreciated for its certainty in detecting slight defects of color-perception, as well as those who are completely color-blind. It can be carried and used anywhere, and the time consumed in the detection of the color-blind is very short; all of which commends it for use on railroads. My experience has not shown me that Holmgren's test confuses the ignorant, and that they are liable by it to make themselves appear of defective color sense; on the contrary they pick out the worsteds with nearly equal facility with the educated of the same color-perception. All recorded as color-blind have been re-examined one or more times with different tests, but with the same result.

Under the head of defective vision are recorded all who failed to read Snellen's Test Types No. XX at twenty feet, with each eye separately; or the other letters at the proper distance. Each per-

son having one or both eyes of vision less than normal is recorded as defective. This makes the number somewhat large, but does not mean that so many are unfit for railroad service. The vision of many can be brought up to the standard by glasses, and others have one good eye, with the other more or less deficient.

I take this opportunity to thank the railroad officials for their uniform courtesy, and for their aid in conducting the examinations by affording me every facility asked. I have the honor to be,

Very respectfully,

WM. T. BACON, M.D.,

One of the Examining Ophthalmic Surgeons of Conn.

REPORT OF DR. W. H. CARMALT,

ONE OF THE EXAMINERS.

New Haven, December 1, 1880.

To the State Board of Health:

Gentlemen,—I have the honor to report that in obedience to your instructions I began, on July 26th, the examination of the railroad employees coming under the provisions of the law of March 25, 1880, with regard to visual power and color-blindness, on the following railroads, viz.: New York, New Haven & Hartford Railroad, Housatonic Railroad, Naugatuck Railroad, New Haven & Northampton Company's Railroad, Boston & New York Air Line Railroad, Danbury & Norwalk Railroad, Shepaug Railroad, New Haven, Derby & Ansonia Railroad, New Canaan Railroad, and continued the examinations according to the published rules of your Board as rapidly as circumstances would permit, until August 20th, when I received orders from you to discontinue the examinations pending action of your Board on a petition of the employees for modification of the Rules.

On August 24th, the following "Appendix to the Rules and Requirements" was issued to me, viz.:

"The following are the rules and instructions for the examination of railroad employees for color-blindness and visual power, which have been added to the printed regulations.

"Rule 1st. Brakemen shall be transferred to Class Second.

"Rule 2d. Certificates shall be retained until all on a given road or within a certain locality have been examined, and then distributed through the railroad officials.

"The blanks after 'find that it is,' shall be filled by 'sufficient under the rules of the Board of Health,' in all certificates granted. Those failing to pass the test for color-perception shall be at once informed as privately as may be, and reëxamined as hereafter provided, at the convenience of the examiner. Care shall be taken to make the employees rejected understand all their chances under the rules.

"RULE 3d. (p. 7.) The following special instructions have been issued under this rule:

"1st, The standard for visual acuteness shall be two-thirds instead of twenty-twentieths.

"2d, Engineers with no progressive eye disease, sufficient color perception, vision of one eye twenty-twentieths, of the other not less than one-third, shall be granted a first-class certificate.

"3d, Those failing in the tests for color-perception (Rule 1, p. 6) shall be tested by such flags and lanterns as are used for signaling on the road in question. The flags shall be two feet by eighteen inches, and both new and old flags are to be employed. The flags by day and the lanterns at night shall be used at a distance of eighty rods. The examiner shall satisfy himself whether the employee can distinguish the color of the flags and lanterns or not, and report the results in rejected cases to the Board.

"By order of the State Board of Health,

"A true copy from the records,

"(Signed,) C. W. CHAMBERLAIN, *Secretary.*"

On August 28th, I recommenced the examinations, acting strictly under these modified rules. On the same day I also forwarded to you the following protest against them:

"NEW HAVEN, August 28, 1880.

"*Dr. C. W. Chamberlain, Secretary, etc.:*

"DEAR SIR,—The modified rules for the examination of railroad employees under the Act of March 25, 1880, as passed by your Board on August 24th, have been received, a few examinations made, and I shall continue to do so, as instructed. I beg leave, however, to state my professional opinion as expert, that by the rules thus modified the tests are crude and unreliable; therefore also impracticable, and render the examiner very liable to give certificates to employees who would not come under the designation of having 'freedom from color-blindness and possession of normal visual power.'

"Respectfully,

"Signed, W. H. CARMALT, M. D."

I continued of course to make the examinations strictly as instructed, making all the haste possible, until September 30th, when I had the honor to submit a report of 906 men examined. Since then 15 men, old employees, have presented themselves, having from various, mostly unavoidable, reasons on their part been unable to do so before. I have therefore examined 921 actual employees. The results are classified in the following tables, which will, I think, give all the information desired.

Whole number of old employees examined,			921
	Whole No. of Employees, by last Report of R. R. Com'rs.	Number Examined.	Per Cent.
On N. Y., N. H. & H. R. R. (including Shore Line),	2,110	474*	.22
" Housatonic R. R.,	420	141	.335
" Naugatuck R. R.,	254	105	.41
" N. H. & Northampton Co.,	354	70	.197
" B. & N. Y. Air Line R. R.,	116	45	.388
" Danbury & Norwalk R. R.,	120	34	.28
" Shepaug R. R.,	60	28	.46
" N. H., Derby & Ansonia R. R.,	54	21	.39
" New Canaan R. R.,	9	3	.33
		921	

* Over 200 more were examined by Dr. Bacon, so that the real percentage is greater on this road.

VISUAL DEFECTS ON ROADS.

	Number Examined.	Defective Acuteness of Vision.	Per Cent.	Dichromatic.	Per Cent.
On N. Y., N. H. & H. R. R.,	474	70	.047	12	.025
" Housatonic R. R.,	141	15	.106	5	.035
" Naugatuck R. R.,	105	15	.142	3	.028
" N. H. & Northampton Co.,	70	5	.071	5	.071
" B. & N. Y. Air Line R. R.,	45	9	.20	1	.022
" Danbury & Norwalk R. R.,	34	8	.235	..	....
" Shepaug R. R.,	28	1	.038	1	.038
" N. H., Derby & Ansonia R. R.,	21	4	.19	1	.047
" New Canaan R. R.,	3	..	....	..	....
	921	127		28	

OCCUPATIONS AND VISUAL DEFECTS ON ROADS.

	Engineers.			Firemen.			Conductors.			Brakemen.			Switchmen, etc.			Station Ag'ts.		
	Whole Number.	Defective Vision.	Dichromatic.	Whole Number.	Defective Vision.	Dichromatic.	Whole Number.	Defective Vision.	Dichromatic.	Whole Number.	Defective Vision.	Dichromatic.	Whole Number.	Defective Vision.	Dichromatic.	Whole Number.	Defective Vision.	Dichromatic.
On N. Y., N. H. & H. R. R., - -	60	12	2	58	4	....	54	9	1	184	22	8	80	17	1	38	7	....
" Housatonic R. R., - - -	23	3	....	27	2	....	15	1	....	43	4	2	16	3	1	17	2	2
" Naugatuck R. R., - - -	16	3	1	9	....	....	11	....	1	31	5	1	19	2	....	19	5	....
" N. H. & Northampton Co., -	11	3	....	12	....	1	8	....	1	19	1	2	8	....	....	12	1	1
" B. & N. Y. Air Line R. R., -	7	1	....	8	....	1	5	2	....	9	2	....	6	....	....	10	4	..
" Danbury & Norwalk R. R., -	6	....	....	5	....	....	4	2	....	10	3	....	3	....	....	6	3	....
" Shepaug R. R., - - -	4	....	1	5	....	....	2	....	....	4	....	....	2	....	....	11	1	....
" N. H., Derby & Ansonia R. R.,	3	1	1	3	....	....	3	....	....	7	1	...	3	....	....	2	2	....
" New Canaan R. R., - - -	1	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Total, - - - - - -	131	23	5	128	6	2	102	14	3	303	38	13	137	22	2	115	25	3
Percentages, - - - - -		.175	.038		.047	.015		.137	.029		.366	.042		.16	.014		.217	.026

CLASSIFICATION OF VISUAL PERCEPTION.

Normal vision in both eyes in all grades of service, - - - -			766	
Defective acuteness of vision in one eye, - - -	51			
Defective acuteness of vision in both eyes, - -	75	126		
Defective color-perception, or Dichromatic vision, -		28	155	921

Percentage with defective acuteness of vision, -	.137
Percentage with Dichromatic vision, - -	.03
Percentage with defective vision, - - -	.168

VISUAL DEFECTS CLASSIFIED BY OCCUPATION.

	Engineers.	Firemen.	Conductors.	Brakemen.	Switchmen.	Station Agents.	Total.
Defective acuteness of vision in one eye, - -	11	3	8	18	4	7	51
Defective acuteness of vision in both eyes, - -	12	3	5	20	17	18	75
	23	6	13	38	21	25	126
Defective color-perception, or Dichromatic vision,	5	2	4	13	2	3	29
	28	8	17	51	23	28	155

CERTIFICATES ISSUED, CLASSIFIED BY OCCUPATION.

	Engineers.	Firemen.	Conductors.	Brakemen.	Switchmen.	Station Agents.	Total.
1st class issued by Examiner, - - - - -	103	120	85	257	114	87	766
" " " under "modified rules,"	14	3	1	...	...	8	32
" " by especial order of B. of H., -	13	3	...	...	...	...	16
2d class issued by Examiner, - - - - -	...	1	10	19	16	10	56
" " " under "modified rules"	...	...	3	7	3	2	15
" " by especial order of B. of H., -	...	...	2	11	3	7	23
Certificates withheld by B. of H., - - -	1	1	1	8	1	1	13
	131	128	102	308	137	115	921

Percentage of Certificates withheld by Board of Health, .014.

AGES OF MEN WITH DICHROMATIC VISION.

Engineers, 29, 31, 32, 31, 39, - - - - -	average, $32\frac{4}{10}$	years	31.
Firemen, 24, 31, - - - - - - - - -	" 27	"	
Conductors, 27, 65, 50, - - - - - - - -	" 47	"	
Brakemen, 53, 28, 33, 20, 22, 28, 21, 28, 22, 23, -	" $27\frac{8}{10}$	"	
Switchmen, 26, 55, - - - - - - - -	" 40	"	
Station Agents, 64, 25, 31, - - - - - -	" 40	"	

In view of the opposition to the methods of examination and the adverse criticism to which they were subjected, in most instances made by persons quite unfamiliar with the examinations as practised, based upon the exaggerated or entirely false statements of interested or prejudiced parties, and entirely ignorant of the subject of optics as applied to vision, I may be permitted to state that the standard for visual acuteness is that adopted the civilized world over as the standard of normal vision for the last twenty-five years. It was arrived at by a series of examinations of many hundreds of eyes carried on impartially as to the result, with no other idea whatever than that of arriving at a strictly scientific and accurate and positive result. This result was confirmed by other independent investigators working in an entirely different way by actual measurements, and no change has been made since ; they are accepted by all scientific physicians as fixed and positive. The standards for testing this acuteness have been, and are, in practical daily use by all physicians practising in ophthalmology for arriving at the vision of their patients with confessedly diseased eyes ; striving always in case of any reduction of the vision below that standard to bring it up to it, and feeling when unsuccessful, that the patient's vision has not been fully restored. Whatever difference of opinion there may be as to the standard is that it is not high enough rather than too high. It was reserved for the counsel of the employees seriously to propose, so to interpret the law that normal vision could be defined to be a sliding scale depending upon the occupation of the individual ! In other words, that the shape of the railroad employee's eye might be different from that of the farmer, or that of the farmer different from that of the shoemaker or other tradesman.

When the International Medical Congress at Amsterdam, in 1879, adopted the rules for the examination of the personelle of the railroad and marine services, presented by Professor Donders, the first living authority as to what constitutes normal vision, neither they nor he asserted any new standard for vision ; they simply formulated for practical purposes well-established laws in Ophthalmological science. It was in the same view that the American Ophthalmological Society, composed of the first Ophthalmologists of this country, at their meeting at Newport this year, approved your rules and requirements.*

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* See transactions for 1880.

During this year, also, the British Medical Association held at Cambridge in August, and the International Ophthalmological Congress at Milan, in September, both passed resolutions advocating a compulsory examination of the vision of all persons in the land or sea services who are obliged to see clearly or to read color-signals. These associations will never advocate nor permit that the standard for normal visual acuteness shall be anything less than the first adopted by your board. Indeed, it is because of the certainty and fixity and universal recognition of that standard. that they venture to make such a suggestion at all. Recognizing that unsuspected defects of vision may be a source of danger, they advocated the only possible way for detecting them with certainty.

The third rule, page 7, of your printed instructions, relating to five years of service, gave to trained employees all the security necessary, to enable them to retain their positions, if proved capable by the testimony of the officials of their respective roads. No one wishes to deny that an engineer, even if his vision is defective, who has worked industriously and faithfully, with the pride which all men feel in meeting fully all the responsibilities of a difficult position, and has become perfectly familiar with his road and its signals under all conditions, thereby acquires a sort of automatic sense of how everything should be, that may take the place of better vision; any change is to him at once a warning. This is not good vision, however; it might fail him in exceptionally adverse circumstances, and would not serve him on an unfamiliar road. He would then be an unsafe man for his train, and it is quite doubtful if such an one could get employment, *if his defect were known*, unless his record for care and judgment were exceptionally clear; and herein is an unfairness to the railroad officials in that the certificates as modified and issued do not state what the vision of the bearer actually is; they cannot know exactly what they are dealing with when they engage or continue him in employment.

If properly enforced, it would put the responsibility where, under the circumstances, it rightfully belongs. *Certificates* to those men should never be issued without a written assumption of responsibility by the officers of the roads employing them.* It is certainly not fair to the traveling public, (to say nothing of the law) to jeopardize their lives, by putting them in charge of an engineer

*No certificates were granted engineers without a guarantee of fitness by experience, training, and character to perform their duties, from the railroad officials. C. W. C.

with defective vision, unless those employing him will assume the full responsibility; so that they cannot plead in defence of damage that they did not know of the man's defect, and had no means of learning it until he had shown it in the destruction of life or property. Every one assumes on entering a train that his engineer has good vision; let it be honestly advertised on the time-tables that the engineer of a given train has less than normal (not "modified") vision, and I doubt not it would soon be shown what the view of the traveler is upon the question; whether he would prefer the "theoretical" standard of science or that which has no better basis than the endorsement of the railroad officials to the petition of the employees as presented to your board.

The conditions of normal vision are such, that an object the size of the test-letters employed, if carried farther away than the 20 feet distance at which the men were placed, becomes too small to be seen by the normal eye—if so seen (and there are many who can see it at a greater distance) that eye has more than normal acuteness. The object must be correspondingly increased in size to be seen at a greater distance, and it is a simple matter of calculation to learn how large an object must be at any given distance to be accurately defined. The test-letter is $9\frac{1}{2}$ millimeters square, the lines composing the letter being just $\frac{1}{5}$ of the height. The corresponding object at 80 rods (1,320 ft.) must be nearly 2 ft. ($23\frac{1}{2}$ inches square) to be recognized—the eye which cannot see the test-letter at 20 ft., but requires the "two-thirds" letter cannot recognize at that distance an object less than 3 ft. (35 in.) square. It cannot with certainty tell the difference between a rock of that size or a comparatively innocent object, if the latter be still, or does not have some distinguishing mark other than its form; and if the vision is but $\frac{2}{5}$ of the standard—such persons cannot see to define an object on the track at the 80 rods, if it be less than $4\frac{1}{2}$ ft. square. If the condition of the atmosphere is unfavorable, if the sun is shining in their eyes, or the day is dark, or twilight approaching, they will not see it in time to stop their trains. It is not of course claimed that an engineer shall see in all conditions of the atmosphere, in daylight or in darkness, it is only claimed by the law that he shall be able to protect his train, so far as vision is concerned, as well as from 87 to 95 per cent. of people would be able to do.

As a matter of fact I know that to cases of "progressive disease," certificates were given. Employees holding important positions were

found with cataracts in both eyes—others with advancing retino-choroiditis—these were however only discovered by reason of their personal courtesy, in allowing me to examine their eyes at my office. It will, under the law, be for your Board to determine when re-examinations in these cases shall be made.

Most superintendents, in discussing this matter with me, have declared that they would not knowingly have a near-sighted man on a train, regarding him as dangerous. I found one such in a first-class position, and in all of the second-class grades of the service, in various degrees. In one instance the man was so near-sighted that he could not see distinctly more than 2½ inches from his face. This man had got along for eleven years somehow, without having made accidents sufficient to lead to his detection, yet never without danger to himself, the company, and the traveling public. If the officials of the road had known of his defect they would not have employed him, but until this examination, there was no suspicion of his extreme defect. Although this is an exceptional case, similar of less degree occurred in both classes.

The opposite visual defect of long, or over-sightedness (*Hypermetropia*) is not to be confounded, though it usually is, in the minds of non-professional persons, with the "far-sightedness" of age (*Presbyopia*). Usually the effects of this defect first show themselves seriously when the person has attained the age of from 45 to 50 years, but then much more seriously than in the person with simple Presbyopia. The latter only has difficulty in using his eyes for near work, he sees at a distance as well as ever, while in Hypermetropia all his vision, for both distance and near, is indistinct; just as indistinct as the corresponding near-sighted defect, and only to be remedied by the same means, *i. e.*, the wearing of proper glasses. Now, while in the second class of occupations, your rules allow the use of glasses, they do not for obvious reasons allow them for the first class. Even if they did, the railroad officials would not trust an engineer to run their trains, who they knew was obliged to depend upon glasses to see distinctly—the consequence is, as the examinations showed, several men were running trains whose vision was so imperfect that they could not see to distinguish an object on the track double the size of one which a man with normal vision (87 % of their own number) could see accurately. Most of these men were aware of their defects, (I refer to those in whom the change had come on in later

years) and several volunteered to me the expression that they had thought for some time past that they ought to give up their work.

I shall defer a discussion of the visual defect called color-blindness (more strictly speaking, however, Dichromatism) for a paper to be found later. I wish to recall to you, however, the statements made when presenting my report on September 30th, that I did not permit myself to be influenced in my judgment, as to the defect in any given case, by the absurd so-called *tests* with the flags and lanterns. Tests they were not, in any proper definition of the term. As examinations I reported them accurately, but inasmuch as I would have regarded it in the highest degree unreliable to have condemned a man on so utterly crude an examination, with instruments of such variable action, and under circumstances that deprived them of all accuracy, so also would I have regarded myself as derelict to the duties of my office, if I had expressed an opinion favorable to one who had passed successfully an examination, where the chances of guessing rightly were in the man's favor. The record of every one's examination was correctly reported.

I wish here to call attention simply to one fact as shown in the tables, that among those in the first class found deficient in color-perception, but *one* was over 32 years of age, the average age of those thus affected being just 31 years. With this exception the defect was in this class only found among men considerably below the average age of their class, which is $36\frac{1}{5}$ years. Now the "practical" railroad official objects to the tests employed for detecting this defect as too "theoretical"—that the men don't understand them (!), and that they ought to be tested with the "tools of their trade," that they (the officials) do so test them sufficiently, and if a man passes their examination he is sufficiently free from the defect to be able to run his engine safely. That *they* can find out if there is anything wrong with his sight. Reserving, as before stated, for a future article what is to be said of the *unsuspected* nature of the defect, I beg leave to suggest that the youth of the men with this defect goes to show that though the tests applied on the roads are too crude, too uncertain to ever detect the defect as such, these men are actually eliminated from the service before they reach the average age of their class by a further experimentation with the lives of passengers and the property of the corporations. At how much sacrifice of life and property we are unable to say. Is the law or the tests which serve to avoid this sacrifice then unpractical?

In further illustration of this point I beg leave to call your attention to the results obtained on the New Haven and Northampton Company's road. That road running into Massachusetts, the officials had, so I was informed by the President and Superintendent, adopting the suggestion of the railroad commissioners of that State, "tested (?) their own men sufficiently well, and there were no color-blind men on their road." By the tables above given, it will be seen, *first*, that the proportion of employees presented for examination, was much *smaller* than that of any other road coming under my observation, *i. e.*, less than 20 per cent., as against 33 per cent. and over on all the others; and, *second*, that the proportion of those having the dichromatic vision was *greater*, by nearly double (.071 per cent.) than that of any other! On inquiry as to the method employed, I found it to be so utterly crude as to be worse than valueless, (as the result of my examination showed,) being carried out or suggested, by some one without the slightest idea of what the vision of persons afflicted with dichromatism really consists.

This ought to show the advantage (necessity) of having the examination at least under the control of those having a scientific knowledge of the subject. In this view, I desire further to state, that the examination by experts is a security to the employee with normal vision; because such an examiner can always distinguish between the "color-blind" and the color-ignorant. I have had several men presented to me with the warning that such an one was "color-blind," and in but one instance did the prediction prove true.

In conclusion, I beg leave to acknowledge the uniform courtesy with which I have been treated by the officers of the various roads. Unnecessary as many of them believed the law to be, and always involving some interference with their work, they gave me every facility I asked for, and were evidently desirous to have every man examined who came within the law.

I am very respectfuly, your obedient servant,

W. H. CARMALT, M. D.,

One of the Examiners.

The following is a summary of the two reports:

Whole number of employees examined,		1,950
Consolidated Road (N. Y. & N. H. & Shore Line),	685	
New York & New England,	452	
Housatonic Railroad,	141	
Naugatuck Railroad,	105	
New York, Boston & Providence Railroad,	133	
Connecticut Western Railroad,	98	
New London Northern Railroad,	76	
New Haven & Northampton Railroad,	70	
Connecticut Valley Railroad,	59	
Air Line Railroad,	45	
Danbury & Norwalk Railroad,	34	
Shepaug Railroad,	28	
Derby and New Haven Railroad,	21	
New Canaan Railroad,	3	
	1,950	

Number in each Class.

Engineers,	291
Firemen,	285
Conductors,	202
Brakemen,	635
Station Agents,	212
Flagmen and signalmen, and switchmen,	325
Total number refused certificates finally,	29
Number leaving their occupation voluntarily when found defective,	9

By consultation with railroad men it was found that the position of brakeman in the middle of the train was not a very responsible one, and that hearing was there more important than vision, as he acted only when signaled by the whistle—or at least almost invariably. Certificates were therefore ordered to many for that special position. Other special certificates were granted for one position alone, experience having demonstrated the capacity of the employee. A list was kept of all such special cases for future re-examinations, at a not very remote period if required.

In other cases where the railroad officials were willing to endorse the man, and employ him if relieved from the liability of a fine, and would so state in writing, special certificates were given when the defects were not too great. In all these doubtful cases the

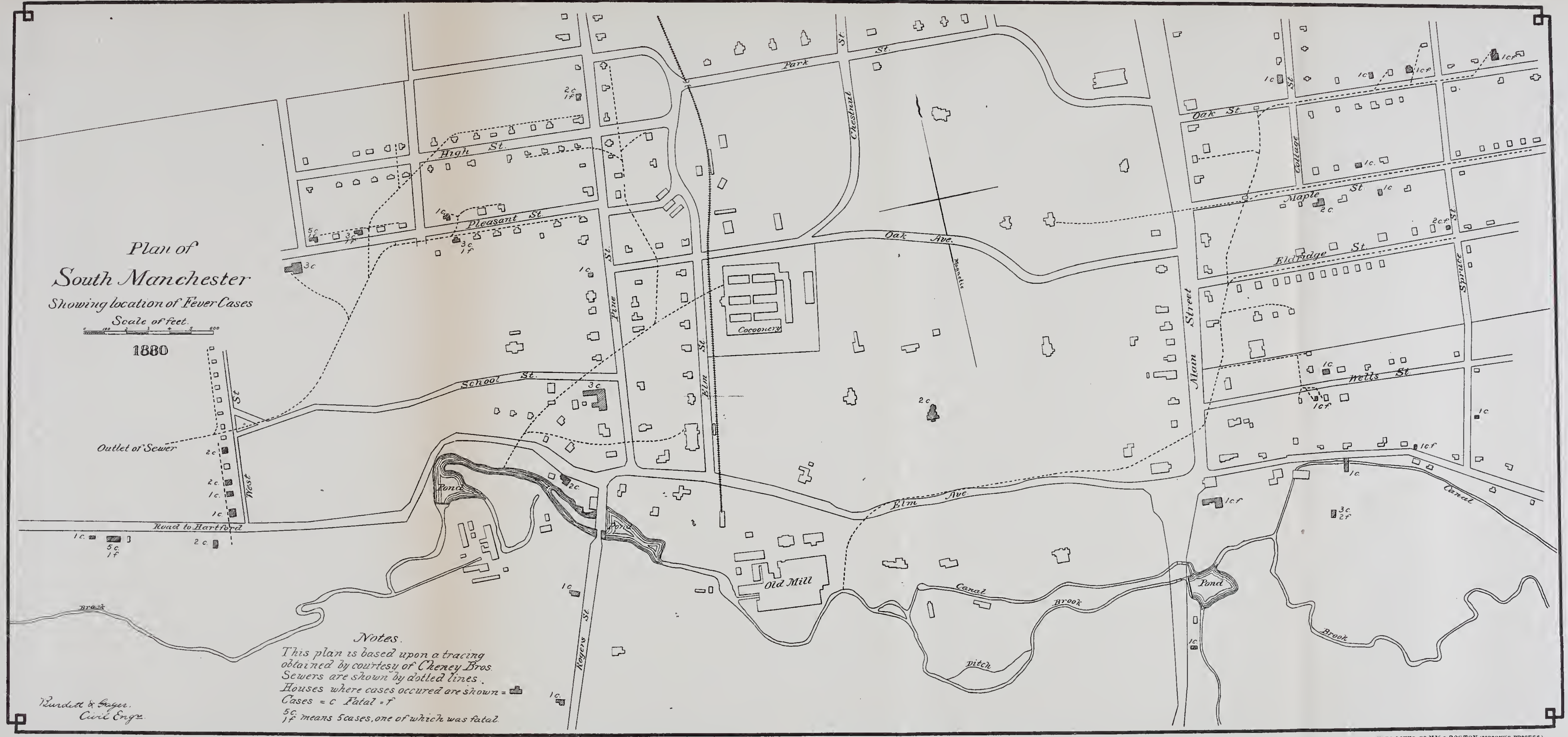
matter still lies in our hands, as we can order a re-examination whenever the exigences of the service demand.

It is not exactly known the number whose occupation was changed by the action of the Board, but the number is larger than the total rejected cases. In all cases where certificates were granted men with progressive disease, a record of the man's condition was taken and a re-examination before in the nature of the case any liability to danger will arise can readily be ordered. As before stated, the whole subject is somewhat experimental as yet; nor is there any universal agreement as to the limit of vision requisite for safety in experienced employees.

TYPHOID FEVER.

The localized epidemic of typhoid fever in South Manchester this fall, and the prevalence of typhoid fever along the valleys of the tributary streams of the Hockanum, as well as of the valley of that river, and of other forms of zymotic diseases, indicate some local cause to account for their frequency. The large number of malarial cases might be more readily ascribed to a natural condition favorable to its existence and spread, caused by the interference with the natural drainage of the region by the frequent pondage of the water by numerous dams along the course, at every available point, for a water supply for manufacturing purposes. The prevalence of typho-malarial fevers, together with typhoid, moreover, strengthens the theory of pollution of either water, or soil, or both. A brief account of the outbreak at South Manchester is given, with a map of the region, showing the location of each case, and the streams and sewers. This map was constructed by Messrs. Burdette & Gager, drawn from a map kindly furnished by the Cheney Bros. Apparently no place ought to bë healthier than South Manchester, and there are few places where greater attention has been paid to sanitary matters, and general cleanliness of the village and its surroundings. The soil, however, is a sandy loam; the depth of the sand is not well known on the upper part of the plain, however, a brook loses itself in the sand soon after striking the plan.

There is in many instances pollution of the soil and infiltration into the wells, the resultant of long years of occupancy. The town is sewered to a greater extent than is ever met with in towns of its size in this State, and the exemption of the sewered portion is as marked as the preponderance of cases where a sewer empties in an open field in the sandy soil—two furrows being turned back to form a sort of ditch. Nearly every house in the vicinity has cases, and the mortality is indicated by the figures. The houses on higher ground also show exemption, as is very generally the



AM. PHOTO-LITHO. CO. N.Y. & BOSTON (OSBORNE'S PROCESS.)

case. Wherever typhoid fever is found it is oftener on ill-drained or low levels, in the valleys or near swamps. There were, in the area shown by the map, sixty-three cases of typhoid fever from July to December, 1880, fifteen of which were fatal. In 1879 there were many cases in this vicinity—several taken into the hospital at Hartford; as was the case this year, so the specific virus of typhoid fever was not lacking; indeed, the disease is endemic along the valley, and as the germ or virus preserves its vitality several years, importation is not needed to originate the disease.

These cases above referred to occurred almost wholly among a colony of Swedes, a portion of whom landed in June from an emigrant ship. The first cases were in the latter part of July, and the shortest fatal case lasted a week; convalescence was slow, relapses not uncommon, the tendency to hemorrhages marked. Many of the cases were apparently typhus, presenting all the characteristics. In many, the symptoms were very peculiar, although they were distinctly typhoid, no intermittent elements to show malarial complications. In other portions of the town, malarial and typho-malarial fevers were nevertheless more or less prevalent.

The brooks shown in the map are polluted to a greater extent than any other bodies of water in the State that have come to our notice. In summer they are often offensive to sight and smell, and are so contaminated as to destroy any forms of fish life, and in many instances the water cannot be used for manufacturing purposes. The streams are polluted by the refuse from paper-mills that use wood, etc., necessitating tons of waste, and from the extensive silk-factories, especially from the cocoonery, from whence enormous quantities of organic matter and chemicals are passed daily into the brook, which is but a few feet in width, but generally quite deep, and of a rapid flow. This waste is of a deep black color, and stains the water for a great distance, for several miles below the mill, and is found deposited upon flats and shallows, and stagnant pools, as well as along the banks of the streams for miles below, until the water reaches the next source of pollution. In the fields below West street, for a long way, the water appears like a thick black gruel, and is so turbid that but at little if any distance it is transparent in a glass dish, less than a quarter of an inch, instead of sixteen to twenty inches, as is the case in pure water. This flocculent mass held in suspension is nearly all organic; the

salts are held in solution, or else precipitated by portions of the organic filth. A stick stirring up the bottom of this brook shows a deposit of several inches in thickness upon objects in shallow pools along its course, *e. g.* a flat rock, while large quantities of gases are disengaged. The putrefactive gases can be seen bubbling up through the water, oftentimes the resultant of decay of organic substances.

The sewers nearly all empty into the brooks, and in the better houses water-closets and a full supply of pure water is found. Thus, in addition to the manufacturing waste, we have sewage contamination. During its passage through South Manchester, the brook receives a greater amount of contamination than a stream five times its size could dispose of safely in a run of five miles, but after a short run this brook is again polluted, and discharges into a stream that already has its sufficiency of pollution before finding its way into the Connecticut.

Whether the local conditions here found caused this epidemic or not cannot be fully determined, as we do not know exactly the influences the emigrants were exposed to upon ship-board. They were not likely upon an emigrant ship to be the most hygienic that could be imagined, and the typhus element indicates some influences of this sort. However that may be, the cases were not confined entirely to these emigrants, although the greater part were Swedes, and if the disease was not caused by the local conditions, they could certainly not have lighted upon much more favorable conditions for the causation and spread of typhoid fever than is to be found in the open sewer in the rear of West street. In these cases too, nearly every one worked in the same mill, the one containing the cocoonery, and thus were subjected to the same local influences. Whether entirely due to local influences or not, the health of the locality requires in the first place that the sewers should have an outlet other than upon the sandy plain, and that the pollution of the stream should cease. There can be no better commentary upon the influence of unsanitary conditions than the diseases that prevail along these valleys, and the typhoid type that is so readily engrafted upon every variety of disease. The prevalence of malarial diseases depends rather upon the retention of the ground water, but by purification of the stream the healthfulness of the whole region would be improved.

This can be rendered profitable, as well as beneficial. The quantities of fertilizing elements that go to waste is seen in the

dense growth of coarse plants along the course of the stream that in their turn shade the soil and cause an unhealthy dampness. If the manufacturing waste were allowed to settle in large tanks before the water was allowed to enter the stream, or better yet, precipitated by lime or some other cheap chemical salt, a valuable fertilizer might be produced. Or better yet, if all the sewage were collected into one trunk-sewer, and were together with the manufacturing waste conveyed upon the waste sandy plains, these might be rendered most highly productive, and immense crops of grain or hay result from that which is now only a curse to health and an eyesore in what is in all other respects almost an earthly paradise. The vile stream that crawls like a foul snake through this beautiful region should be purified, if only for the added element of beauty a clear, limpid stream would give to the landscape; when increased health and wealth as well would be the resultant, it seems strange that such a condition of affairs is allowed to exist for a day.

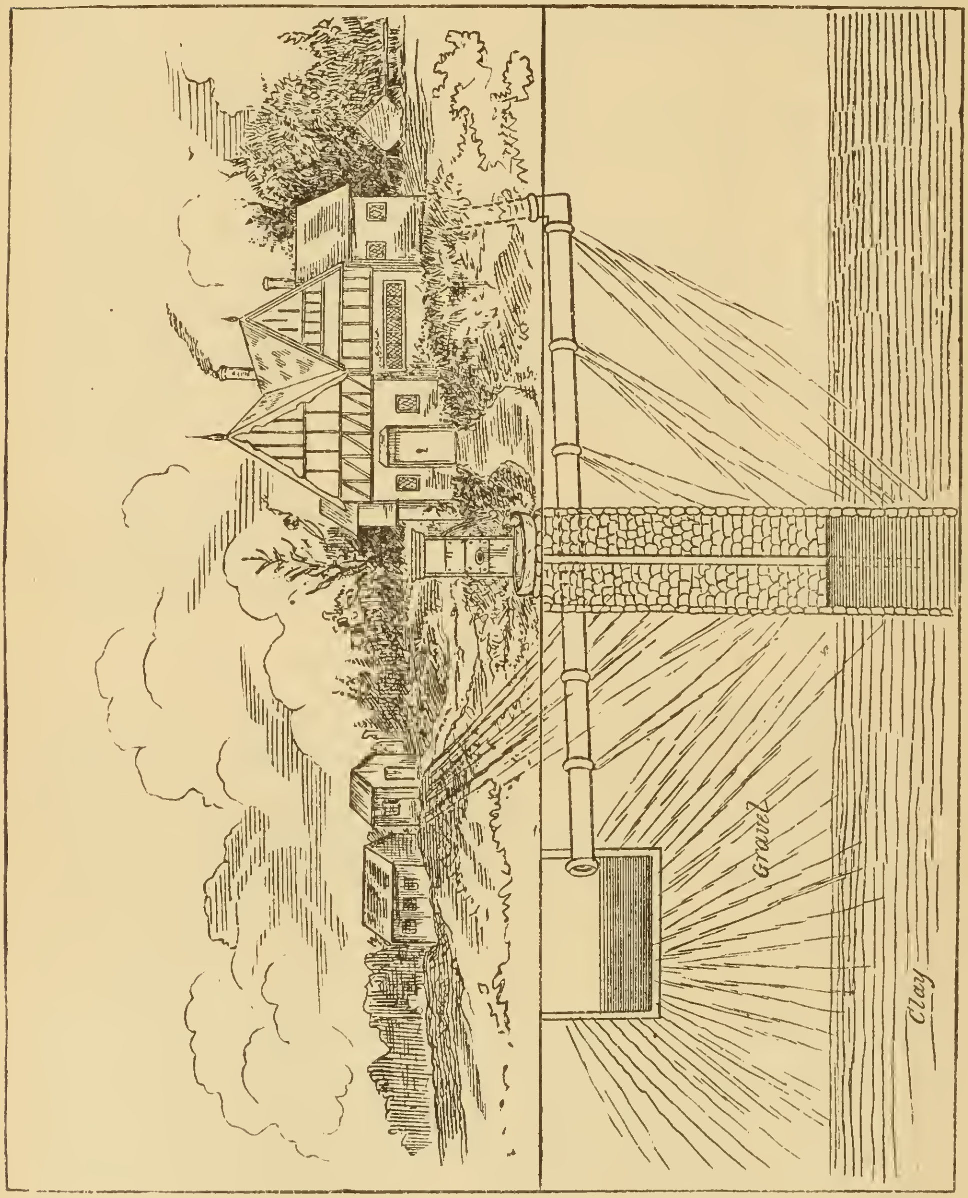
Typhoid fever is endemic in this State, but no other local epidemics are reported this year. In view of its importance and prevalence, a pamphlet concerning its restrictions will be prepared.

RESTRICTION OF TYPHOID FEVER.

As typhoid fever is one of the endemic diseases of this State, often manifesting itself in local epidemics of greater or less extent and severity, it has seemed wise to endeavor to diffuse a little more certain knowledge concerning its causation and prevention.

Typhoid fever is a type of the group of diseases to which the name *filth-diseases* has been given; in brief these are thus named because they are spread by excremental filth and sewage, and rendered more malignant, if not directly produced. Indeed, a fever scarcely if at all distinguishable from typhoid fever is doubtless directly produced by such emanations. However disgusting it may be, it is doubtless true that typhoid fever may be received into the system by inhaling through the air we breathe, or swallowing in the water we drink particles of *fœcal matter* that had their source in a patient sick with the typhoid fever. The evidence is conclusive that the choleraic dejections dried and scattered through the air by the winds have produced wide-spread epidemics of Asiatic cholera. No less conclusive is the evidence that the dejections of typhoid fever patients that have found their way to the air we breathe or the water we drink have, in numerous

instances, caused cases or even epidemics of typhoid fever. So plain is this evidence, that epidemics have been traced to the milk of the dairyman diluted with water thus contaminated, or, at least, the pans and utensils washed in such water, as in the epidemic at

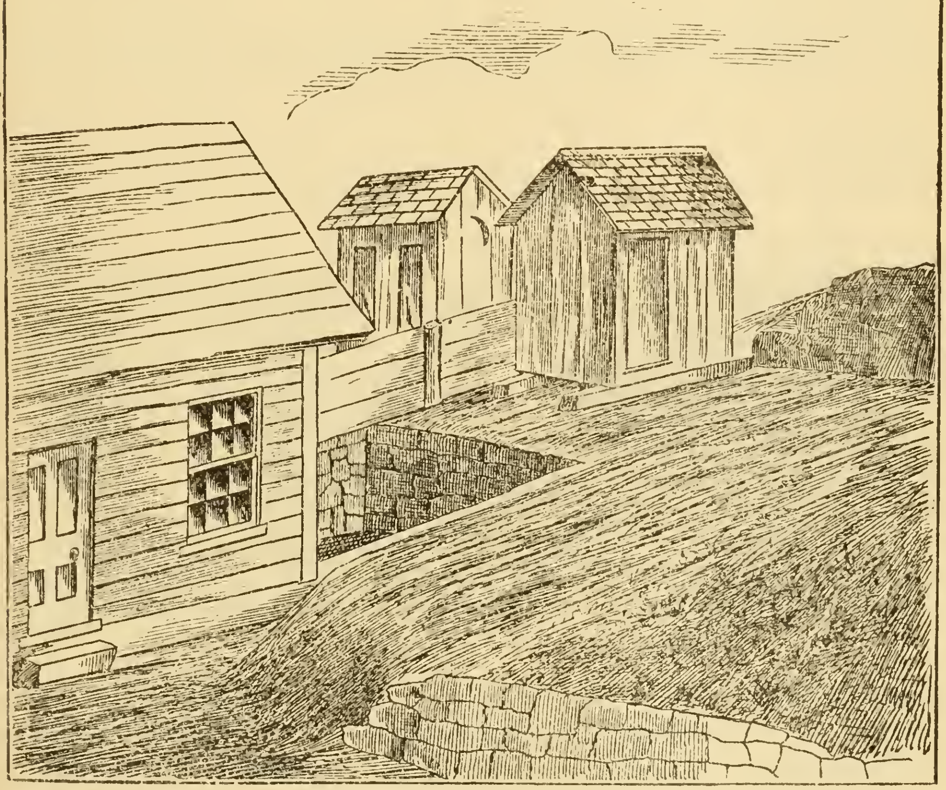


Parkhead, described by Dr. Russell. Near London, 500 cases were thus caused in 104 families, 96 of which were supplied with milk from one dairy; the contamination in each case was traced to contaminated water by typhoid dejections. Instances might be multiplied to any extent. Milk has also been a vehicle for the conveyance of other diseases of this class, as diphtheria, for instance.

The cases where the well has been thus poisoned and become a vehicle for the transmission of this disease, would, if all collected, fill a good-sized volume. An illustration of one or two, however, may be of service in fixing the facts in mind.

In the house shown in the foregoing illustration, there was a severe, in fact fatal, case of typhoid fever; the dejections were thrown sometimes into the cess-pool, sometimes into the privy-vault. It will be seen by the illustration that the drain leading

Fig 6



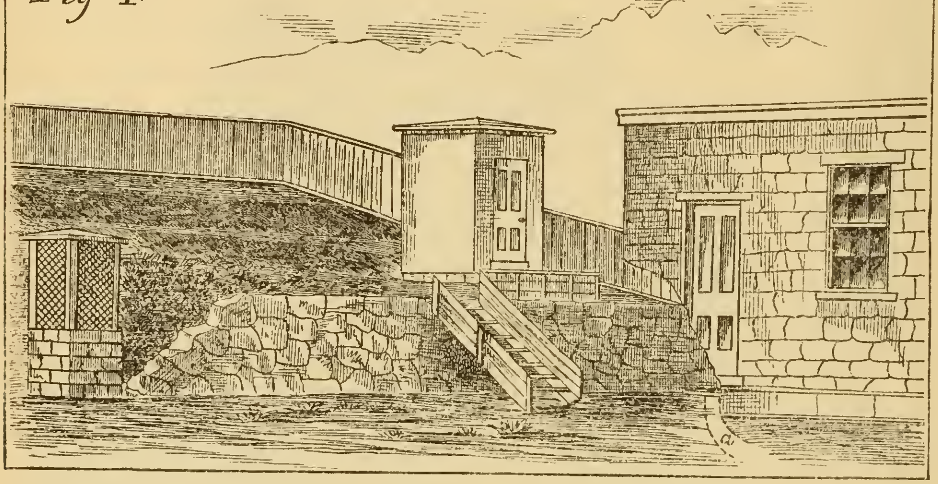
to the cess-pool passes the well, and is laid with loose joints in a gravelly soil with a clay substratum. The water from the well was thus easily polluted from both sources. The water from the well was used by several neighboring families, and by relatives who came several months later to visit the family, and by servants engaged for the increased summer work. In ten of sixteen who used the water of the well, typhoid fever ensued with a fatality much above the average.

The second illustration is of the apparent production of typhoid fever directly by filth. There was no traceable connection with

any preceding case. The well is not shown here; it was on a level with the house, five or six feet lower than the privies, and about equally distant from each; between them and the house. A fatal case of typhoid fever occurred here. It is difficult to eliminate contagion from a preceding case, as this may be preserved for years, and then act with, if anything, increased vigor. An instance of that was afforded lately, when the contents of a vault that had not been cleaned out for fifteen years, at least, was emptied, and the contents spread upon the land where a heavy rain washed portions into an adjacent well, the water from which started an epidemic.

The instances are so numerous, however, where cess-pool fever, as it is sometimes called, has arisen directly from polluted water,

Fig 4



air, and soil, that the possibility of such causation must be allowed; whether such cases are to be called typhoid or not is immaterial. The preceding illustration is similar, the danger of the pollution of the well water is very evident; here however, we have the combined influence of vault and drain. The sleeping-room of the patient opened a few feet above the window shown in the picture. These are not fanciful sketches, but drawn from real life.

In another case that came directly to my notice, the cess-pool was but a few feet from the house, with a lead pipe leading from the sink directly into it—the cess-pool was unventilated, and never cleaned, as the watery portions drained away in the gravelly soil. The chamber occupied by the patient was directly overhead—in the healthy, open country, this death-trap was ingeniously constructed.*

* See circular on rural hygiene.

Typhoid fever then is an infectious disease; the dejections from the sick, unless disinfected, can contaminate the water, air, and soil, and thus perpetuate and reproduce the disease. The possibility of the disease being *inhaled* from the receptacles where the typhoid dejections are placed must be borne in mind. There is danger if the dejections be thrown upon a refuse heap. "A villager who had contracted typhoid returned home, where there had been no typhoid for years; the excrements were thrown upon a dunghill; several weeks later five persons were employed to remove this heap, four were soon afterwards attacked with typhoid fever, the other with"—symptoms like it. The excrements of these five were buried deep in the same heap. Nine months later of two persons employed in completely removing this heap, one died of typhoid fever.

It attacks all ages, but especially those in youth and the prime of life; hence, its ravages are most detrimental to the State. Eighteen in every one hundred attacked die; the mortality rapidly increases in persons over thirty as age increases. It appears in all seasons, but is more frequent in autumn. It has of late become more especially a disease of the country rather than the city, especially if the cities have an abundant supply of pure water, and are well sewered, otherwise we find typhoid fever as prevalent in the city as in the country. One attack is a partial protection against a second. Some persons and families are peculiarly liable to the disease.

Allusion has already been made to care in spreading the contents of infected vaults on fields. Near Stuttgart in 1871, the meadows were manured with sewage; the aqueduct supplying the city was partially supplied from these meadows; rain fell January, 1872, carrying organic matters from the sewage into the aqueducts. In those parts of the city thus supplied, typhoid raged so extensively that there was a patient in every other house, while not more than usually prevalent in other parts of the city.

Where water-closets are supplied from a cistern that furnishes drinking water to the house, the supply should be *direct*. Roth mentions an instance where the evacuations of a typhoid patient were thrown into such a closet, the pipe of which passed to the cistern—no less than eight persons were thus infected. The air between the closet and the cistern is in such cases always foul, and this air must bubble up into the cistern before any water can descend.

Soil-pollution has been instanced. The most striking case is that of Munich, where the filth is thrown upon the ground and upon adjacent fields; typhoid is markedly prevalent, and unusually fatal. The usual practice in villages, and even in large towns and cities, too often is to secure a supply of water for drinking and other domestic uses upon the premises, usually from a shallow well. In the small lot upon which the house stands,—and the larger the village the smaller is this building-lot,—three holes are dug in the porous soil; one is used as a privy-vault, one to receive all the waste and filthy liquids from the house, the other to pump drinking-water for the family; these are often but a few feet apart—ten or twelve feet is no uncommon distance—even if they are as far separated as the limits of the lot will allow, they are in many cases dangerously near, and similar receptacles on adjacent lots add to the evil. The privy-vault and cess-pool are seldom cleared; often when the vault is full, a new site is selected near by and the old covered with a little earth, while the porous nature of the soil is relied upon for the latter; soil-pollution and contamination of the water is only a matter of time. To this must be added the soaking from surface-filth which drains into the well. Unfortunately, the soakings from excrement after passing through a few feet of soil do not render the water unpalatable, nor are germs or virus of disease separated, as shown by the numberless epidemics thus caused. The influence of the ground, air, and water have been shown in a preceding circular on rural hygiene; how readily they become contaminated is easily seen. "Privies and privy-drainage with their respective stinkings and soakings, and the pollutions of air and water which are thus produced, have in innumerable instances been the apparent cause of outbreaks of typhoid fever, but further, they have seemed capable of doing this mischief in a doubly-destructive way; first, as though by some aptitude which other nuisances of organic decomposition, though perhaps equally offensive, have not seemed equally or nearly equally to possess, and, secondly, as though this specific property so often attaching to them, in addition to their common septic unwholesomeness, were not even in them a fixed property. The explanation lies in their liability to carry with them the specific *contagion* of any bowel infection." The whole subject of soil-pollution is fully presented in the essay by Prof. Lindsley in our second report. The effect of defects in public sewers and leaky house-drains is there fully discussed; they can only be mentioned

here as a frequent source of soil-pollution. The evils that result from large vaults thirty to fifty feet deep have been fully demonstrated in Memphis and other cities, and are mentioned as instances of folly not likely to be repeated.

PREVENTION AND RESTRICTION.

The most general method of diffusion of typhoid fever is through the dejections of the sick; by these, too, the specific contagion of the disease is preserved for an indefinite period in uncleaned vaults and neglected refuse-heaps. It is uncertain, even in the soil, how long the contagion preserves its vitality—instances are on record where the contagion has been conveyed two miles through underground water-courses, and then produced the disease.* To trace the connection, various chemical salts were placed in the water, and in due time they appeared in the distant brook. Of course such salts were selected as were soluble, but not found in that vicinity, or country even. Various experiments to prove contamination of well-water have been made; the shortest time in which a substance placed in a cess-pool found its way into the adjacent well that has been recorded is fifteen minutes. Often after several hours a salt thus placed is found in the well. The time depends upon the distance, nature of the soil, and the channels of communication that have been established. The danger of infection from the dejections of the patient being granted, the most obvious means of prevention is to disinfect all discharges from the bowels. These should, be received in vessels containing a pint or more of copperas or zinc solution—the latter is more cleanly, as it does not stain, and fully as efficient; it is however more expensive. The copperas costs but a trifle. The vault where the dejections are cast should be disinfected daily with at least a gallon of the copperas solution, or, if poured down a water-closet, the solution should be freely used after each deposit. If this plan were thoroughly followed, the specific contagion of typhoid fever might be stamped out.

POLLUTION OF SOIL AND WATER.

This can readily be prevented, if the waste products are used to nourish vegetable growth, instead of allowing them to accumulate in deep receptacles, where nature's processes are rendered

* Purification of water-carried sewage.—*Robinson.*

inactive. Every house, almost, has lawn enough to dispose of the kitchen waste; if it were conducted a little below the surface in porous drain-pipes over the whole area, the grass-roots would soon render it harmless, nor would there be sufficient accumulation in winter to pollute the soil—or, the drainage from the sink could be conveyed to the garden and then led from point to point in shallow trenches, thus used as a fertilizer, instead of contaminating the sub-soil. If a cess-pool be inevitable, the bottom and sides should be cemented; it should be well-ventilated, and often cleaned and emptied. The liquid contents may be conveyed by a drain leading away from the well and some distance above the bottom, so the solid matters may settle; these should be carted away.

The privy vault should be cemented, and ventilated by a pipe running to the roof of the building, and often emptied and disinfected. When emptied, lime may be used freely—the copperas solution is the best to disinfect and deodorize its contents, and should be freely used in the summer months. Where practicable, the use of dry earth is strongly recommended. A very little care in this respect will remove all annoyance and danger. If an automatic hopper be thought too much trouble, a heap of earth may be placed in the rear, and a little thrown in with a shovel every day. The sides and bottom of the vault should always be cemented, for cleanliness and ease in removing the contents. Where this plan is pursued, a hinged door for the rear wall of the vault is a convenience. The earth thus used should be covered to keep dry, and if used freely can be used repeatedly. For indoor use in the country, especially in winter, the earth-closet is recommended. One can easily be improvised, and wood or even coal-ashes used in place of dry earth. For villages, the pail-system has proved successful, and the plan is self-supporting after the first outlay. The fertilizing value of the material pays for the cartage, or very nearly. In this plan a set of tubs is provided. These are removed regularly, and an empty clean one set in its place. The plan requires combined action, but a few can inaugurate the plan, when its advantages will soon induce others to join. The only way to prevent contamination of soil, air, and water is to remove all waste before putrefactive decay sets in. The use for such waste is to nourish plant-life, as by nature's chemistry the old is constantly reconverted into the new. One advantage of the pail-system is, that a plan for garbage removal can readily be combined with it. Decaying heaps of garbage are almost as

offensive as excremental nuisances, and, unfortunately, in our cities and towns too little care is manifested in removing garbage. With ashes and other refuse, it is used in filling depressed places—coves and the like. Too often is disease and death the result of building upon land thus made. Fermentation and putrefactive decay takes place in such land for at least seven years, and such emanations are deadly.

The ease with which drinking-water is contaminated with the specific contagion of typhoid fever emphasizes the care that should be used in disinfecting all typhoid dejections, and in their ultimate disposal, and the importance of securing a pure, uncontaminated water-supply. Typhoid fever diminishes in frequency in nearly exact ratio with the success in securing pure water, and a complete and rapid removal of filth. A wet, undrained location with damp, misty exhalations from the soil, as a matter of course, predisposes to typhoid fever, but it is more influenced by the ground-water, as that becomes polluted.

The principal points may be thus summarized:

Typhoid fever is an infectious, self-propagating disease; the living body of the infected person is the soil in which the specific contagion which causes the fever breeds and multiplies. The contagious matter by which typhoid fever is mainly perpetuated is cast off chiefly in the intestinal discharges. Privy vaults and other receptacles of these discharges become the medium of transmission of the specific poison. Once cast off this contagion acts in two ways, either contaminating drinking water or infecting the air. On account of the vitality of the contagion, its minuteness, and the multitude of ways in which it may be transmitted, it is often untraceable. By destroying the infective nature of the discharges the spread of the disease may be prevented.

The discharges infect the air of the sick-room, the bed and body-linen of the patient, the privy-vault or other receptacle into which they are thrown. From the privy-vault the poison often sinks into the well. When this happens it is the most deadly of all forms of fever-poisoning. A rubber sheet should be placed under the linen sheet, over the mattress, to prevent the discharges from infecting the mattress, as well as for cleanliness. The hands of attendants may be washed in the zinc solution or bromo-chloralum.

Thorough ventilation of the sick-room is of the greatest importance. The dresses of nurses and attendants should be disinfected after the termination of the case.

In case of death the body should be at once placed in the coffin and disinfected. It may be wrapped in a sheet wet with a solution of chloride of zinc.

Cases of fever do appear where the evidence is apparently conclusive that they were caused directly by filth, without the intervention of a previous case. These are often called cesspool fevers, but they do not differ essentially from typhoid.

The rules for its restriction and prevention, in brief, then are:

1. Thoroughly disinfect all intestinal discharges from patients with typhoid fever.

2. Prevent pollution of water used for domestic purposes by fœcal impurities.

3. Prevent the pollution of the air and soil by filth, or the putrefactive decay of organic substances.

4. Secure a well drained site for a dwelling house, with sub-soil drainage around the outside of the cellar walls.

The disinfectants most reliable, as well as cheap are—

1. Copperas, 50 pounds to a barrel of water. Four gallons will usually be sufficient for a vault used by one family; afterwards a smaller quantity daily; one pound to a gallon of water may be used..

2. Sulphate of zinc, 8 ounces; chloride of zinc, 2 ounces; water, 4 gallons.

3. For boiling cotton and linen goods, one part chloride of zinc to two hundred of water. Burnett's Fluid is a solution of chloride of zinc.

The two latter do not stain, and have no odor.

It is not intended to decide any of the mooted points upon the etiology of typhoid, but simply to state facts that are known.

BOOKS, ETC., ADDED TO LIBRARY BY GIFT AND PURCHASE.

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Dress in its Sanitary Aspects, Roth.
Hygiene and Education of Infants, Walton.
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Diseased Meat, Cressy.
Easy Lessons in Sanitary Science, Wilson.
Is Consumption Contagious? Clapp.
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Health Studies, Paterson.
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Microscopic Fungi, Cooke.
Algae, etc., Nave.
Habitual Drunkenness, Bucknill.
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Ventilation, Reid.
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TREASURER'S REPORT.

Expenditures from Dec. 1, 1879, to Dec. 1, 1880, .	$2,044.95
Salary of Secretary, ...	1,000.00
	$3,044.95
Cash on deposit, ...	420.00
	$3,464.95
Bills outstanding, about, ...	$325.00

RECEIPTS.

Cash, ...	$3,000.00
Balance from old account, ...	464.95
Total, ...	$3,464.95

Approved,

C. W. CHAMBERLAIN, M.D.,
Treasurer.

C. A. LINDSLEY, M.D.,
Auditor.

DETAILED STATEMENT.

Printing,		
For Bureau of Vital Statistics, .	$321.25	
For Sanitary Department, . .	106 13	
For Color Blind Act, . . .	154.37	
		$581.75
Sanitary Engineers, ...		219.50
Photo Lithographic Co., ...		281.00
For Library, ...		355.38
Traveling Expenses, ...		361.25
Postage, Telegrams, and Express, . . .		95.00
Sanitary Investigations and Analysis, . .		68.75
Stenographers and Copyist, ...		46.50
Stationery, ...		35.82
Total, ...		$2,044.95

C. W. CHAMBERLAIN, M.D.,
Treasurer.

I have examined the accounts of the Treasurer of the State Board of Health for the year ending November 30, 1880, and have compared them with the accompanying vouchers, and find them to be correct.

C. A. LINDSLEY, M.D.
Auditor.

The amount expended in direct sanitary work is much larger than during the previous year. It must be remembered, however, that the fiscal year of the Board ends Dec. 31st, a month later, hence quite a portion of this belongs to the item "bills outstanding," that is, work under way, but not finished when the report was made. The same is true for every year, as work is constantly going on; some accounts will thus overlap.

It is earnestly recommended to every town to secure a systematic index of their records of births, marriages, and deaths from the commencement of the record. The best book for this purpose we have yet seen is Burr's Index on three letters, thus rendering reference to many similar or synonymous names easy. They are not supplied from want of funds, partly, and partly because it is useless unless the towns will take the requisite action in ordering the records indexed. No other records deserve this more than those of births, marriages, and deaths. Many errors and omissions too, might, and probably would, appear in time for correction.

REPORT

ON THE

Plans for Warming and Ventilating

THE

BRIDGEPORT SCHOOL-HOUSE,

TO THE BUILDING COMMITTEE OF THE BRIDGEPORT (CONN.) HIGH SCHOOL.

BY

ROBT. BRIGGS, C. E.,

Cor. Mem. Am. Inst. Architects, Mem. Am. Soc. C. E., Mem. Inst. C. E. (English),
Mem. Amer. Philos. Soc., etc.

PHILADELPHIA.

REPORT ON THE PLANS FOR WARMING AND VENTILATING THE BRIDGEPORT, CONN., SCHOOL-HOUSE.

BY ROBERT BRIGGS, C. E.*

To the Building Committee of the Bridgeport High School:

GENTLEMEN:—After a very full examination and consideration of the plans for warming and ventilating a proposed school-house at Bridgeport, Conn., I have to report upon them as follows:

A preliminary inquiry into the problem of warming and ventilating in general may properly be instituted before taking up the particular requirements of this school-house, or of the apparatus proposed to meet these requirements. And the first striking and noticeable observation to be made is that there has been either a degree of failure or at least a want of positive success in previous efforts, attendant nearly alike upon the best reasoned and most expensively constructed apparatuses, and upon those founded in absolute error or positive ignorance, or carried out in parsimony or in fraudulent cheapness. The *best* authorities are those who qualify their conclusions or deductions most happily, and the most competent experts are admitted to be those who are least satisfied with attained results and least positive as to expected ones. The appliances for steam-heating received their development to the most approved form of to-day, scarcely forty years since, from the hands of the late Joseph Nason, but the applications have not, with these forty years of experiment and experience, as yet taken any typical form, such as becomes the proper foundation of mechanical development. Success in any mechanical application is exhibited by the adoption of some definite type, like the compound marine engine, the western river engine, the locomotive, etc., which type is subject to modification and improvement from many hands without departure from the generic order.

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It may be, from the physiological point of view, that ventilation is more important than warmth, but from an instinctive one, warmth is immeasurably more essential. Every animal will go to the limit of suffocation for the comfort of warmth. To meet the natural requirement of man as an animal, ventilation must be made subsidiary to warmth. Criminals, hospital patients, orphan scholars may be regulated to healthful ventilation, but independent legislators, audiences attracted by any species of entertainment, school-teachers in schools, workmen in shops, people in houses, insist upon being comfortably warmed despite all sanitary proclamations. All the world resents being "done for" on general principles, especially as to the liberty of being comfortable.

In our Northern United States of America the problem of successfully warming any room whatever in cold weather has been met in two ways: The close stove and hot-air furnace. Let us consider stove warming. Any room, nearly regardless of dimension, can and will be adequately heated by a stove whose capacity to burn fuel is in almost direct ratio to the cubic capacity of the room. While the larger rooms have an increase of cubic capacity more considerable than that of the surface to be heated—the former increasing as the cube while the latter increases as the square—yet is is found practically that the distribution of the heat presents obstacles in the larger rooms that nearly compensate for the advantage of smaller proportionate cooling surface appertaining to such larger rooms.

A stove may be and generally is placed at one side or one end of the room, not near to the window or outer wall, and yet by some natural process the room will be warmed to a tolerably uniform and comfortable temperature. Near the windows in very cold weather, the leakage of air and cooled descending currents may be found objectionable, to avoid which, in the extreme north, carefully closed joints and double sash are resorted to. In all climates there is some balance of discomfort which people endure rather than troubling themselves to remove the cause. The houses of Maine are nearly if not quite as comfortably warm as those of Georgia.

Adopting this location of the stove in a room, it will certainly, if large enough, adequately warm the room, and the inquiry now follows: in what way does it do so? Some portion of the heat evolved from the stove will be transmitted or radient, but the heat of the stove-surface is dark heat, and although the material, and

the surface upon the material, is usually such as will give out the largest proportion of radient heat due to the temperature—yet most of the heat will have been dispersed by the current of air which ascends around the stove. Even the heat which radiates from the stove will have been expanded without loss in passage through the air, upon the ceiling and walls, from which it will be taken up by the air-currents through contact. Some theorizers attribute great comfort and importance to the radient heat coming directly or by reflection from open fires, substances in active ignition, but none of them attach value to the radiations from stoves or dark-heated surfaces, where extended surface and comparatively low temperatures, at the highest not to exceed 400° to 500° Fahr., are recognized conditions for healthfulness.

Surrounding any stove in active operation, there exists an envelope of air gradually ascending, as it acquires heat, toward the ceiling. In what way does this envelope come to have any considerable thickness? Air is nearly a perfect non-conductor of heat; one particle of air does not, or at least very slowly, receive heat from another particle. As before stated, air transmits radient heat without absorbing it. Only the thinnest film of air can possibly be in contact with the surface of the stove at any instant of time, and yet it is only by contact that the air is heated.

In fact, the air does not, nor does any fluid, whether gaseous or liquid, slide upon a surface along which it passes. The movement is a rolling one. D'Arcey describes the movement of water in a pipe to be similar (but reversed) to the stripping of a glove from the finger, by turning the glove-finger inside out. In a similar rolling movement the sheet of air passing the stove comes to have definite thickness, and involves in its rolling process particles of air remote from the ascending stream. As a stone thrown into a pool transmits its vibrations over the surface, so any disturbance of a fluid body confined in an enclosure is transmitted and communicated throughout the fluid to its most distant part, with some relative intensity. There rises from the stove a current of air of considerable volume, acquiring, as it ascends, a nearly uniform temperature, but with a nucleus hotter than the general temperature of the room. This heated air endeavors to find its level next the ceiling, but to do so it must not be assumed to slide in under the warm air which it finds in contact with the ceiling. Instead of this, the interposition will be accomplished by a rolling action similar to that on the stove-surface, wherein one

set of particles rolls off and the other rolls upon the ceiling with mutual admixture and equalization of temperature in the process.

With the accumulating of a stratum of heated air next the ceiling a corresponding absorption from the floor-stratum must have occurred. The necessity for the stove at all is the presumption that some loss of heat must have been going on at windows and walls equivalent to the heat imparted by the stove. The windows and walls impart "cold" in the same way and after the same laws of convection as the stove imparts heat. In one part of the room the stove will have been forming an ascending current of considerable intensity or velocity all around itself, while at another part, the windows and cool walls will have a sheet of cool air of less velocity but of equal heat-value traversing them downwards. The most uniform distribution of heat will be effected when these currents become the most general, extensive, and consequently most moderate. Suppose the stove to have its position remote from the windows and cooling walls, and to be so placed that the average extent of window or wall-surface or exposure shall be equidistant from the stove; it can then be asserted that the column of hot air from the stove will, after rising, roll upon the ceiling and become intimately mixed and equalized in temperature with the air it finds there, and that the sheet of descending air from the windows and walls will roll out upon the floor and intermix with the air on that level, establishing an equality of temperature in that stratum. Within certain well-known limits of size or shape of room and with a close room, the lower 6 or 8 or 10 feet of height of the room will be heated by a stove in any weather, so that the differences of temperature within that height shall not affect the comfort of the occupant.

Where the stove employed is so small as to demand inordinate heating of its surface to impart the required quantity of heat, successful warming is secured by protecting the occupants from direct radiation by screens or inclosing envelopes which are found to accelerate the rising current of hot air. And this is done without very materially impairing the distribution of heat. And even when the sash are not very tight in the window frames, tolerable uniformity of ground temperature is reached.

It may be well to look at the effect of a leaky sash in an otherwise close and well-warmed room of a cold day. Suppose a window of 12 panes of 12″ by 18″ glass to consist of two sash of 3′ 3″ square, there will be 13 feet long of joint to each sash which

may be taken at $\frac{1}{32}$ of an inch looseness, or an entire opening of 5 square inches. Accept the average temperature of the air within the room to be 70° and of that outside to be 20°. Then the air within the room weighs 0.075 lbs. and that outside the room weighs 0.084 lbs. per cubic foot; 13.34 cubic feet of air at 70° and 11.9 cubic feet of air at 20° weighs one pound. Taking the height of the window to be 6′ 6″, the mean height of influx or efflux will be about 5 feet, when on the supposition of a close room, there would leak out of joints, near the top, about 5 cubic feet of air per minute, and leak in, near the bottom, the same quantity. The cooling effect of such a window from leakage of cold air at its sashes is only what is demanded to heat 5 cubic feet of air from 20° to 70° each minute. Its cooling effect from conduction or radiation is far greater. The worse result from the cold air leakage is the streak of cold air which is apt to traverse the floor near the window, comparatively unmixed with warmer air. And it is to be noticed that the leakages at sashes do not generally balance themselves by ingress at the lower part and egress at the top, more frequently (the room heated being in the lower story of a building) the cold air enters at all parts of the window, when, as the height of the column of heated air will run up to, say, 30 feet in place of 5 feet, the quantity of cold air (the foregoing supposition as to dimension and looseness of sash being accepted) entering and to be warmed, rises to nearly 25 cubic feet per minute.

While the adequacy of the close stove to effect comfortable warming can be made a positive averment, and the economy of this method of heating over all others is certain, yet the large majority of houses, dwellings or otherwise, are heated in our Northern United States by means of the hot-air furnace, and this heating is nearly equally successful with that of stove-heating. Comparative uniformity of temperature, certainly within limits of difference to which custom has habituated most people, is attained with the supply of hot air introduced on the side or back walls of a room, remote from the points where the heating effect is to be expended, that is, from the cold windows and cool walls. In general no provision whatever is made for the escape of air, and the inflowing hot air expels by leakages alone an equal amount of the normal air in the room. If not by leakages from the windows within the room, which in such case leak outwards only, then by escape through open or leaking doorways into halls or passages, and thence most frequently upwards into stories above, when the height of

the heated column considerably accelerates the velocity of efflux at the cracks of windows in those upper stories. The circulation of air and the distribution of heat in any furnace-heated room is strictly analogous to the process described as pertaining to stove-heating. Whatever direction of entry may be given to the air from the furnace register, it soon takes an upward flow, carrying with it by contact, more or less intermingled, an auxiliary stream of air derived from the general atmosphere of the room, while the downward currents against the window and cool walls give the direction to a general circulation by which alone some uniformity of temperature is established. In dwelling-houses the separation of rooms is more defined near the ceiling than upon the floor, the doors being headed down several feet below the level of the former, while they are brought down to the latter without break. This demarcation defines the heating effect of a stove or a hot-air furnace current perceptibly. Take two parlors with an open doorway between them, the furnace current being in one and not in the other of them. In the one the cool sheet on the windows and walls will derive its auxiliary supply from the hot air next the ceiling, and the floor current established thereby will have a much higher temperature than that occurring in the adjoining room. The one may be comfortably warm while the other is decidedly cold.

One of the earliest objections to furnace heating was the inadequacy of means for escape of air in quantities such as were needed for proper ventilation, and numerous attempts to provide eduction flues and registers were made. The combination of perforated ceilings or of "ventilating" flues in the upper part of the room was advocated and advised. Diagrams of rooms, sections, or plans were judiciously arranged with arrows or tinted clouds, but the practical result showed a lamentable perversity in the hot air. With little intermingling it would make a bee line from the lower entering to the upper escaping register, and form isolated cold circulations at the foot of cold windows or walls and isolated hot ones in the corners of the room near the ceiling. Besides this, the "systematic" ventilation most generally had separate ventilating (eduction) flues for each room with separate flues of discharge above the roof, and there was a propensity for one or more of several of these flues on the same building to overpower another, when a downward current of cold air would set up in such other flue, to the great discomfort of the occupant and discomposure of the designer.

Practice and experience has demonstrated to the constructor of

hot-air furnace apparatus that even with his hot streams from the furnace he cannot rely upon the establishment of efficient currents in flues or outer walls; he must protect the heat of his ducts on their passage, and place them upon an equality of resistance, not merely to give each of several flues the same motive force in heat, but also to prevent one or more from acting in the reverse direction as part of a circulation. It is not at all infrequent in extended heating apparatuses (either hot air or steam or hot water), to find air-flues with a down draft. [In such cases the casual examiner will often declare that cold air is *coming* from the flue—as the hand is not very sensitive to the direction of the current. By wetting the hand and holding it in the current, the *cold* side will detect the course of the air at once.]

There has slowly come into use, as a matter of luxury or fashion, in the more expensive houses, an open fire-place or low grate in combination with a system of air-furnace heating, wherein the heat of comfort is derived from the latter source; and it has come to be recognized that, without the use of the fire-place or grate, ventilation is in some measure promoted by the chimney-flue; the hot-air currents become efficient with larger volumes and with less intensity, and, besides this, the circulation within the room and the equal distribution of heat are, if not improved, at least not impaired. Only one or two of such fire-places are provided on each story, if not in any entire house, so that the difficulty of double ascending flues from one room, before alluded to, does not commonly arise. [We treat our well-warmed houses as a single room on each floor, if not as a single room in the whole house.]

In most, if not in all cases where an open fire-place is constructed in a room heated by a hot-air furnace, the hot-air flue is located in the same chimney-breast with the hot-air register, discharging near the floor, although with the provision of discharging along the side of the room at the end of the breast, in lieu of outward from the wall. The sole protection to prevent the air from the hot-air flue being sucked at once into the chimney flue is this arrangement. No trouble is found in the distribution of heat in a room thus provided with flues and fire-place, although the latter may be removing a quantity of air nearly equal, or sometimes in excess of, the air admitted at the hot-air flue in close proximity.

So much has been said in this report upon these common methods of heating not as the presentation of novel views, but to set forth clearly that the distribution of heat in these cases is

entirely owing to the cooling effect of windows and walls. Shut off the radient heat of a stove, and it is not warmest near the stove in cold weather. More than thirty years ago Wyman noticed and published that the air near a hot-air register was colder than the average temperature of the room.*

These preliminary remarks have been made so extended for the reason that before discussing the question of the Bridgeport School Warming and Ventilation it seemed desirable to demonstrate that distribution of currents of air in a circulation involving the whole of the air within any room was indispensable to the most favorable forms of apparatus for spontaneous movements, and by parity of reasoning become incident and necessary for other kinds of apparatus when smaller differences of temperature, and larger volumes of air to be moved, demand every economy of the effective force.

§ It is proposed to erect in the city of Bridgeport, Conn., a building for the accommodation of the public high-schools, in which there is to be on each of two stories six school-rooms, each to be occupied by fifty scholars. It is further proposed to ventilate these school-rooms with a supply of fresh air amounting to 30 cubic feet of air per minute for each pupil, in all moderate winter weather, that is to say, when the thermometer is above 20° Fahr.; but when a lower temperature is reached it is proposed to restrict the air supply to not less than 20 cubic feet per minute for each pupil when the thermometer is at zero, Fahr.

To accomplish this ventilation, the arrangement for introduction of air is to admit the fresh air after it has been adequately heated at an opening to be placed in the rear wall of the school-room (in each room) remote from the windows and cool walls. The effective cooling average surface of which, windows and walls, being as nearly equidistant from the point of admission as the form of rooms will admit. This opening for admission will be elevated above the floor to such height that the incoming current will not be thrown upon any person standing upon the teacher's platform, while the direction of inflow will be made towards the window and at the same time rising towards the ceiling, the air receiving guidance from the register-plates or from the duct leading to the register. And, in connection with this system of admission, the arrangement for extraction of air is to withdraw the cooler and

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* Wyman on Ventilation and Warming, 1846.

partially-vitiated air from the surface of the floor, through the entire opening of the riser of the teacher's platform. This platform being located in the rear of the room, and being, say, 12 feet in length and 6 feet in width in each case. This method of withdrawal is adopted with a view to take from the coolest stratum of air within the room, intercepting in part the flow of that stratum. The previous argument of this report has been to show that such a flow is incident to the general circulation necessarily accompanying any effective warming of any room, independent of any ventilating currents. It now becomes proper to consider whether it is desirable to use such ventilating currents to aid and promote the general circulation, or otherwise to use them to intercept and prevent this circulation.

It is nearly impossible to apply any figures to the velocity of currents which would result from this arrangement; it can only be said that, involving the complete contents of the room (if the desired movement is successfully attained), they are the lowest possible for thorough distribution. Some approximation may be made, however. The proposition involves 30 cubic feet to fifty scholars, or 1,500 cubic feet of air per minute. The register of influx has been planned to have 2 feet by $2\frac{1}{2}$ feet of mouth = 5 square feet of surface, and the stream of emerging air within 1 foot of such a register, although one-third its surface may be obstructed by bars or screen-work, may be taken to have the same sectional area. Whence the velocity of the incoming air 1 foot in front of the register may be assumed to be 300 feet per minute, equal to 5 feet per second.

Suppose the entering air to spread out to 3 inches thick upon the ceiling, and to traverse the same for its whole width of 27 feet. The cross section of this sheet of air, normal to the direction of flow, becomes $6\frac{3}{4}$ square feet, giving a velocity of flow of 3.7 feet per second. But it can be relied upon that six or eight times this thickness of sheet of flowing air on the ceiling would be involved in the general movement, and also that the rate of traverse in different parts of the ceiling would be variable, as the current may have been directed from the stream from the register, or may have been induced by the action of the walls or windows in demanding greater or less supply for the downward currents against or near them; and the consequent velocity of the augmented current will become much less than the 3.7 feet per second.

The figures, therefore, which give a maximum velocity (after the

stream from the register is once dispersed) at 3.7 feet per second, only serve to demonstrate that if the *general circulation be established* and maintained, and if it be not disturbed, the velocity of current of warm air within the room will be imperceptible. Currents of air are perceptible, in some measure, as their temperature and their dew-point is less. At 70°, with our usual dry air of winter, 2 feet per second will not be felt, nor will it produce injurious effects.

The platform is to be 6 feet by 10 feet, with one step about 8 inches high. This gives 16 feet long of front riser surface, but from the location of the platform in the corner of the room, and the probable direction of current on the floor setting towards it, the length of the line normal to the direction becomes 12½ feet, and it can be assumed that the opening of perforated front to the riser (wherein the perforations would equal three-quarters of the surface) would be 6 inches high. These dimensions give 6¼ square feet of normal perforated front, which, 1 foot in advance of the front, will have an air-current with 6¼ square feet of cross-section normal to its direction of flow. The quantities of air going out being the same as those entering, the velocity of efflux on this line becomes 4 feet per second.

But there exists a great difference between an in-flowing and an out-flowing current of air. Each particle of air to which a direction of motion has been given has that direction as positively as a cannon-ball, and it will not swerve from the same without encountering positive resistance. So that a stream entering in will follow its path with much persistence; but any particle of air in a receiver in the state of rest, and under pressure, will pass towards an aperture of discharge in the direction of *least resistance.* Omitting some condition of eddies arising from form of aperture, every particle of air equidistant from a given opening will rush towards that opening with equal force, and the resistance arising from eddies by no means establishes the linear direction which *movement* imparts. It consequently follows that this effluent register, into which the vitiated air is induced to flow, by means of an exhaust-shaft of suitable power, will not only take air from the stratum of 6 or 8 inches, but will suck in air from every direction indifferently, nearly independent from the velocity of flow on the floor. That is, the air along the floor, for 2 feet of depth, may be moving generally at the rate of six inches per second, and yet there may be a current entering the perforations of the risers of the platform at the rate of 5⅓ feet per second, without materially

affecting the absolute velocity of air at any level 18 to 20 inches in front of the risers.

In brief: If it can be accepted that the supply of the proper volume of hot air (or rather of fresh air at the proper temperature) will be established by spontaneous movement at the same time that there will be extracted, through the same agency, a like quantity of vitiated air, it seems very probable that the system of distribution and of equalization of heat proposed will aid in the process, and that any system which does not accept the natural circulating movement would be encountering the resistance of overcoming this movement. It is seen also that the great general movement presents the least resistance with the strongest probabilities to equable heating, and that such movement entails velocities of air currents much below the sense of feeling of persons within the room. Except close to openings of supply or discharge, or close to windows, it is nearly certain that these currents can only be found by floating substances (smoke or illuminated dust) or by filaments of silk.

The employment of large volumes of air upon the distribution of temperature within the room, in lieu of no air at all, as in the case of the stove, or of a small volume of highly heated air, as in the hot-air furnace, is a problem. Unless the heating apparatus of itself establishes a more extensive circulation, the cooling effect of the windows and walls cannot be neutralized, except by the attainment of the same degree of heat in the upper parts and by supposing the same temperature of cold on the floor. Some reliance may be felt, however, that the larger volumes proposed will allow a lower temperature at the ceiling and a much higher one on the floor, while increased auxiliary currents will follow the windows and walls, tempering these downward currents to moderate and endurable coolness before they reach the floor. The extreme cold layer traversing the panes of glass should be intercepted, before it falls or follows the wall to the ground, by a broad and level window-seat that will throw it inwards to mingle with other descending air. A splayed window sill is to be avoided, as it furnishes a surface to a cold streak to reach the floor, over which it will roll with little loss of heat to the annoyance of any person in its path.

It may be thought that, in restricting these observations so completely to the distribution of heat, there has been want of proper consideration of the requirements for ventilation. The truth is, that the property of diffusion of gases renders it possible to accept, that any arrangement of warming and ventilating apparatus which shall

uniformly distribute the heat of the air will have completely equalized its chemical properties. If within any given school-room there is supplied a proper quantity of air, and if the room be made comfortable at all seasons with that supply, it may be taken for granted that the ventilation is *perfect.*

The method of ventilating and warming by means of currents involving the *general* circulation of air induced by the cooling action of windows and walls is thought by the writer, as an arrangement of low-temperature heating apparatus applied to school-rooms, to be novel. The most suggestive example of some prominence, approaching to this proposal, may be that of the McLean Asylum for the Insane, at Somerville, near Boston, where there was constructed a hot-water apparatus supplying to the building definite volumes of moderately-heated air through ducts and flues, and there were provided foul-air flues leading to the basement, with passages to an eduction shaft, which was heated, at all seasons, to induce a draft. The distribution of air in this case was made by its entry from openings in the side walls next the ceiling into a general corridor. From this corridor the fresh air flowed by louvres over doors to chambers on both sides of the corridor into those chambers, where it circulated by descending along the cool windows and walls to the floor. Within those chambers a general circulation was presumed to exist. The vitiated air was extracted by openings at the foot of the wall, on the inside of the chambers. The same wall separating the chambers from the corridors carried both order of flues. This apparatus was highly commended after trial in 1848,* and has continued in use until this day. The provision of the heated eduction-shaft obtaining its heat from the smoke-stack of the apparatus in cold weather, and by means of an independent fire at other times, with adequate proportions of ventilating flues and passages, so that they would not overpower one another or the shaft itself, was very well designed.

More recently, in 1873, Prof. G. R. Barker, of Germantown, Pa., patented a double register, to be used in an arrangement where a flue passing from the cellar to above the roof of the house was made to serve both as hot-air and as exhaust flue. Suppose a brick flue, say 12 inches square, to have been formed in a wall from the cellar to the roof, and to terminate in an open chimney; let there be an outlet from the flue to take two registers, one above the other, this outlet to be near the floor of a room; close off the main flue below the floor by a horizontal plate or diaphragm,

* See Bell on Ventilation, Boston, 1848.

which itself has a central opening with a pipe, say 9 inches diameter, from which an elbow is jointed to the upper register. There will now be a connection between the furnace placed in the cellar at the foot of the flue and the uppermost of these registers, forming a clear passage-way, whose least dimension is 9 inches diameter, for the flow of hot air into the room. And, at the same time, there will exist a passage for foul air through the lower register, passing the 9-inch pipe and its elbow and up the flue. A part of Prof. Barker's scheme was to place a small "*jet*" pipe on the elbow leading upward, so as to use hot air from the furnace (under control of a valve), to improve occasionally the draft of the foul-air flue.* The complete closing of the hot-air register can open this jet at all times, and thus relieve the hot-air furnace of its intensity of accumulated heat when no heat is required in the rooms. The plates which close the registers turn on horizontal axes, and give direction to the hot air upwards and outwards, and receive the vitiated air from downwards and inwards. This contrivance, which has the hot-air register absolutely contiguous to the cold-air register—one above the other—has been operated successfully in many cases during the past six years, and no practical difficulty has been encountered from the hot air passing directly to the cold-air register.

There is one point to be made in this question of distribution of heat in a room. So far it has been the purpose to show, by reasoning on general usage, the cooling action of the windows and walls was the sole reliance in all self-acting or automatic heating apparatus. It remains to give the results of experiment in a particular instance, which shall corroborate this reasoning.

In the Prospect St. School-building at Bridgeport, an arrangement of flues and heating apparatus has been provided in some of the rooms, similar in most regards to what is proposed for the new High-School House, and this arrangement has been tested in service during the past year with much satisfaction. Notwithstanding the unsuitableness of the season for exhibition of *heating* effects, an experiment was instituted on the 12th of July, 1880, in the presence of several members of the Board of Education and the writer, who carefully noted the conditions and results. This experiment was intended to show the completeness of the distribution

* In practice, Prof. Barker prefers to omit this jet pipe, as in the hands of janitors or servants it is apt to be misused. Over 500 of these double registers are now in use in public and private buildings around Philadelphia; 50 or more of which are in school-houses.

of heat and the establishment of a general circulation, by the aid of inflowing and outlet flues, both of which were placed in the rear wall of a room (the middle wall of the building). The day was a very warm one, following several hot days, and the hour 5 h. 10 m. to 6 h. P. M., and a clouded sky brought the external temperature to coincide nearly to the probable average temperature of the twenty-four hours and very close to the probable temperature of the walls of the building. The glass windows, which were closed to make the experiment, had of course the temperature of the external air. The temperature of the external air was 78°, and the same temperature existed (with an allowance of 2° to 3° in discrepancies of thermometers) at seventeen points in the room, previous to admission of hot currents.

The room itself was in the third story, 54½ feet long by 20½ feet wide, with a bay or alcove 19½ feet long by 8 feet projection on the front side. The height of the room was 14 feet. The ends and rear wall are partitions; the front wall has a southeast exposure, with two large windows in the main room and three smaller ones in the projection. The rear wall carries the flues. Two inlet flues, each 12″ by 19″ in section, open into the room about 8 feet from each end, at the height of about 7 feet from the floor. Two outlet flues, 8″ by 45″, take out from the room, about 3 feet from each end and close down to the floor.

Twelve thermometers were placed on the walls around the room and in the alcove, and one other placed in the middle of the room; all of these were placed at the height of 6 feet. Four others were placed at the inlet and outlet flues.

The experiment was commenced at 5 h. 10 m., the hot air beginning to flow in both inlet flues instantly, and coming out at 130°. The efflux followed with instant celerity. All the thermometers indicated, practically, the same temperature of 78°. Whatever difference of temperature any one of them indicated, the same difference was maintained in all previous observations, and was attributable to differences in the graduations and not in temperatures, except that there was an elevation of one or two degrees above the average in two cases at the wall opposite the influent registers. At 5 h. 20 m. the influent air had risen to 160°, and the effluent air reached 81°, while the general temperature, 6 feet from the floor, had become 84°, with two or three local changes, at points distant from the hot-air registers, and also in the middle of the room, where 84° to 86° was indicated. At 5 h. 30 m. the influent

air was 145°, the effluent 84°, the general temperature 90° to 92°, 6 feet from floor, with the same small differences in particular localities. (All the heat was shut off that was possible at 5 h. 30 m., but no material reduction of temperature of inflowing air was effected at 6 h.) At 6 h. the influent air was still at 145° and the effluent at 84°; with the general temperature, 6 feet from the floor, at 92° to 94.

At 5 h. 20 m. a pan of lighted rosin was held before one of the influent registers, and the smoke therefrom was allowed to diffuse with the current of air throughout the upper part of the room. This experiment was scarcely as satisfactory in indicating the direction of the inflowing current as it would have been if unaccompanied with heat of burning itself. [Fine foundry-dust will make a dense cloud, with very slight propensity to settle in the air.] Yet the indications were positive as to the rising of the current to the ceiling, and before 5 h. 30 m. the entire upper part of the roem had become laden with smoke slowly descending, generally, but with somewhat greater descent near the walls, and especially the outer walls and windows, towards which the inflowing air was impelling the same across the ceiling at a rate of motion just perceptible to the eye.

The annoyance of smoke became great throughout the room at 5 h. 30 m., and the room was deserted until 6 h., when it was found to be nearly free. at least so free from smoke that the room, except from its great heat, was endurable. There was no means at hand to measure the quantity of air introduced and removed ; with the size of flues it is not probable that in mild weather it is so ample as might be wished, but the provision, such as it is, is much greater than in ordinary school-rooms. The only convincing demonstration from this experiment was the action of the cool wall in promoting equable distribution without violent currents, and the independent action of the influent and effluent flues, the one giving its current and the other receiving its supply from the air of the room, without the slightest direction of current from the one to the other.

Summing up the whole of the argument upon distribution of air in a room, it may safely be concluded that within certain limits of dimension and form of room, such as will give proportionate force to the two orders of currents, namely, that coming from the force of influx and the suction of efflux, and that coming from the descent of cooled air along the cooler side walls and windows, the

method of introduction of fresh and eduction of vitiated air, set forth in the plans, should be approved. And, as an opinion on the particular application of the method, the writer believes the school-rooms of the proposed Bridgeport High School are well proportioned for the desired result.

§ At the same time it must be fully recognized that no school-room, or room occupied by a number of persons similarly to a school-room, has yet been successfully warmed and ventilated to the extent proposed by the means of any spontaneous ventilating apparatus. While the distribution of heat within the room becomes one of the essential requirements of an apparatus, and one that has frequently, not to say generally, failed, there exist other conditions, all of which must be met adequately before success is attained.

Primary of these, in connection with the distribution, is the supply and discharge of the air; there must be a motive force to effect both of these separately, and each room must be independent of all other rooms in these regards. A long argument would be needful to establish these statements fully. Brief consideration and assertion will be substituted instead. Each room, by itself and of itself, must, together with its inlet and outlet flues, be considered as one shaft or chimney. Such shaft, starting as a flue from an air-chamber at the ground level, and having a small or limited sectional area, rising some height to an enlargement—the room itself—the sectional area of the room being so out of proportion to that of the flue that the velocity of flow through it or the eddies occasioned by the flow may be imperceptible—and thence again to another flue of limited section rising to and above the roof. Now there are two ways for this chimney to draw: the first of them is by means of heated air supplied at the bottom; the second is by heating the out-going flue above the room, or, in case of many flues, gathering them all to one shaft (corresponding to the supposed air-chamber at the ground) where heat is applied. *To effect abundant spontaneous ventilation it is necessary that both of these ways should be combined in the same apparatus, and it is nearly indispensable that each of them should be perfect in itself.*

In the coldest or in moderately cold weather, below 40°, possibly, the ascensive power of the heated air at the furnace, combined with the ascensive power of air in the room at 70°, if the flues are large enough so that the velocity of current in them is not great, may induce the system to operate. But it is by the intensity of

heat in the air going to the room that it obtains velocity, and the supposition of ample ventilation is one of low heated currents in the coldest weather. A computation of the effects of cooling of the walls and windows of one of the proposed school-rooms appears to demonstrate that the entering air, amounting to 1,000 cubic feet per minute (20 cubic feet for fifty pupils), cannot easily be higher than 90° to 100° when the external air is at zero. It is all that can be reckoned upon to accept this quantity as passing the register of ingress, if no additional impulse were afforded by the outgoing flue. This being the most favorable condition with a supposed diffusion of 70° between the external and internal temperature, how must it be when this difference becomes less and finally disappears?

Taking the lower room of all, there may be a height above the mean height of the heating surface to the inlet-register of 10 or 12 feet, with a difference of temperature of 100° to 70°; and taking the height from the outlet-register to the top of the stack, 50 to 55 feet, with a difference of temperature of 70° to zero, the relative value of the two flues in producing a draft becomes apparent. Even in the uppermost rooms, where there will be a height of hot-air flue of 25 feet, with the difference of 100° to 70° to compare with the height of vitiated-air flue of 22 to 27 feet with the difference of 70° to zero, there is yet an enormous preponderance of value for the suction flues. This is the comparison of value of hot-air and ventilation flues in the coldest weather, and with *closed windows.* As the weather becomes warmer, the heat imparted to the air, at some external temperature not far from 55° to 60°, no heat whatever is demanded—not for the English reason that 55° to 60° is a comfortable living temperature in our American climate, with air of 60 per cent. hydration, but because the heat of the pupils will bring up the heat of the room to 70° readily. It now comes to pass that the motive power for operating the systems of ventiltion *must all be found in or beyond the eduction flues.* * Dr. Luther V. Bell, who designed and described the McLean

* This method of argument is not very convincing. In truth, in the system of two flues combined, with one room as an enlargement, the whole considered as one shaft, is the proper one. If the height of the hot-air flue be taken at 12 feet (at 100°), the descent in the room at 8 feet (at 85°), and the height of the uptake flue at 55 feet (at 70°), the height of the column becomes 59 feet (at zero), there then would be needed 69.4 feet of air at 70° to balance the 59 feet at zero, or 70 feet at 100°. The velocity of passage of air in either flue would differ inconsiderably, and the sectional area of the flue can be the same. There is a temperature when the *quantity* of air moved by rarefraction of the column *decreases* as the heat increases.

Asylum, asserts that the window openings must not be considered in any plan for systematic ventilation. "Experience has ever demonstrated that buildings in which open windows are relied upon are never ventilated at all." It cannot be allowed that this dictum applies, except perhaps to a hospital. Out of prison, human nature will assert itself, and will open windows on the south side every mild day, and all around on every warm one. A little higher temperature, and windows are open altogether. For a large part of every year the success of the ventilating apparatus must depend entirely, or in great part, upon the operation of the eduction flues. They alone can bridge over the time between active heating and fully-opened windows.

It is not necessary to argue that the heating flues should be independent, that is, separate for each room, or for each register in each room. Hot-air furnace practice has determined this beyond question. It is a feat to balance anything in unstable equilibrium. It is possible to get two currents to come from one flue, each with its particular desired velocity; provisions for regulation may meet all supposable disturbances of original adjustment, but it is better to avoid all need for adjustment, and all after-control, by making two flues. The analogy between the heating flues and the eduction flues is complete. After reasoning out the relative importance of the eduction flues, as has been done, the disastrous result of disturbance of the function of one eduction opening, by derangement of supply or delivery of another, can be appreciated.

The writer wishes to express the decided view that to ensure the successful working of the low-temperature heating and ventilating apparatus proposed, both orders of flues—those for fresh or for vitiated air alike—should be independent flues, each room or each register mouth by itself; so that any pair of flues, together with the room to and from which they pass, should form a perfect shaft commencing and terminating, in all cases, at the same level.

As regards the sectional areas of such flues, were not the case of open windows at times to be considered, it would answer that they all should be the same throughout (proportionate to the space to be heated), but, taking this contingency into account, *each* flue can have a sectional area due to its height. It is not deemed necessary that the effluent flues should be anywhere proportionally larger than the influent ones, although it might seem advantageous to take out by the effluent flues some of the air admitted at windows or doors, or leaking in at the same, yet the disturbance of

the draft of the effluent shaft is a more serious evil than the possible gain in the removal of the excess of air from the room. To meet the condition of an out-of-doors heat of 62° if moist, or 70° if dry, or higher temperature, it is proper to make an opening for discharge of foul air into the effluent passages from the upper part of each room, near the ceiling. Such an opening should be closed by a valve tighter than those usually provided for hot-air registers.

The air supply for such an apparatus should be taken from two if not four sides of the building, with an open passage through or across the basement to avoid effect of wind on the supply, and should be led into one common chamber, from which, as a receptacle, the fresh, cold air should be taken. The vitiated-air flues should be led upwards to one common level (or they may be led downwards to a common level), where, at not less than 6 or 8 feet above the highest register, they can all be joined, preferably, into one common shaft, but certainly with advantage into not more than two shafts. The juncture of these flues should be easy in direction, so that the current in each shall tend to promote that in the other. The common shaft should be heated, to induce the needful draft. The main smokestack can pass up one side of it, and where it passes along the shaft be of cast-iron, to give out heat. The air-shaft should be reduced in size at the top, commencing some 6 to 10 feet down, say, to three-quarters the area of the air flues. According to an erroneous hypothesis, it has been thought desirable to increase the size of a chimney or shaft to allow the smoke or air to escape at a lessened velocity, but it is found in all practice that a reduction is needed to give the escaping smoke or air the suitable direction to resist horizontal winds. Draft shafts or chimneys are improved by conical or pyramidal surfaces to the coping around the top.

§ Having thus fully discussed the questions of the introduction and distribution of air, there remains yet something to be said about the methods producing and controlling its heat. The proposition under discussion involves large volumes of air heated in the coldest weather to comparatively (to usual heating apparatuses) low temperature, and scaling downwards, as the weather becomes mild, to no heat at all. Observation has determined positively, within the last twenty or thirty years, that in occupied rooms there is demanded, to preserve a relative freshness of air, 30 cubic feet of fresh air each minute per person, and that children as a rule,

demand much the same volume of air as adults. It has become usual, consequently, for those who plan a building—dwelling, hospital, jail, school, audience-hall—to accept this doctrine, and aim at providing the apparatus to accomplish this requirement. Notwithstanding the professional or mechanical skill, or through want of one or the other, or of both, the repeated essays have not met with favorable results. No example can now be pointed out where a complete, unquestionable success has been attained. Some of the more extended apparatus for hospitals, jails, and legislative halls have, by the aid of mechanical or forced supply of air, been measurably successful. On a smaller scale, where self-acting currents, aided by chimneys of "appel" or suction shafts, have been applied, the degree of success attained has been generally less positive. While with apparatus dependent entirely on self acting currents, the whole system resolves itself into hot-air supply at high temperature, with control, in moderate weather, through admission of air at windows, to temper the heat, if the quantity of air shall have been maintained.

The difficulties of heating to desired low temperatures these large volumes of air are secondary only to those accompanying the distribution and introduction. What means or appliances, and what control, is demanded to accomplish the result? The surfaces of any hot-air furnace in use in the United States, when giving out their maximum heat capacity, are available to produce currents of from 250° to 400°. With much arrangement for mixture with other air, the temperature of hot-air furnace currents can be brought down to 150° or 200°. Below these temperatures, hot-air furnaces may be said to be inoperative, except by admitting cold air over the fire, with consequent great loss of heating effect of the fuel.

Steam-heating is limited to the production of currents from 80° to 120° above the normal air. The temperatures of surfaces of steam-heated pipes runs from 212° to 230° (for low-pressure steam, such as meets favor for heating apparatus), and these temperatures are, practically, uncontrollable whenever steam is admitted to any coil or radiator.* Attempts to control the heat of steam surfaces

* There are in use two forms of apparatus which allow lower temperatures to the steam-heated surfaces: 1st, that of Jas. O. Morse, of New York, who constructs a house-warming *vacuum* steam apparatus to run below atmospheric pressure, and to produce surface from 160° to 230°; and 2d, that of Loftus Perkins, of London, who constructs a steam apparatus of small hermetically-sealed pipes, affording surfaces of from 80° upwards to 600°, if requisite.

by throttling the steam supply are very unsatisfactory. Coils give out heat determinately until the last moment before being shut off. They fill with water, they freeze up. After the nicest adjustment, if they do not yet give out too much heat, they will, with the increase of pressure in the boiler incident upon their being shut off in part, be found, in a few moments, as active as ever.

It is obvious that the only relief from these difficulties in steam-heating is to be found in some arrangement of heating surface which shall control either the extent of surface under full steam pressure, to suit the variable requirements, or which must divert the whole, or a part, as occasion requires, of the air being supplied, from contact with the heated surface, and thus "temper down" the heat of the stream passing to the rooms. These mechanical devices can be readily arranged. The main points are to have it fully appreciated that they are necessary, and that they shall be at all times judiciously manipulated.

§ Whatever success may be reached in the combination so desirable to make of ventilation and warming, the question of prime cost or of economy in working must not be overlooked. If fully studied and planned originally, the cost of ventilating ducts or flues does not form an unreasonable addition to the cost of the building in which they are placed, and in so far as this cost goes toward the fulfilment of the vital purpose of a school-house, a reasonable expense of 3 to 5 per centum of the value of the house may be incurred without risk from the charge of extravagance, and such an expenditure will meet the approval of all sensible taxpayers or voters. It has come to be generally admitted, for the cost of a steam or hot-water apparatus, regardless of the more pleasant and healthful heat they are capable of producing, that for all extensive uses they involve less expenditure in a few years, say, eight or ten, than the best devised hot-air furnace. If the committee restrict their specifications to appliances of established merit which have the warrant of being merchantable as general commodities, they can rest assured that their apparatus will be immediately serviceable and of great durability. Not that there may not be improvements in boilers or coils or radiators of recent date of much value, but that the experimental development of inventions which are any way dispensable cannot safely be made by any public body intrusted with construction.

The question of economy of working demands in this particular

case of the Bridgeport School-house some thought. The expenditure for fuel and also for attendance of a well-devised steam or hot-water apparatus of a certain size, is less than that of any hot-air furnace system, although the heating effects may be produced by much larger quantities of heat within the rooms warmed thereby. This economy of fuel arises from two causes. The first of these, and principal one, is the superior efficiency of a steam or hot-water boiler in taking up the heat of combustion—that is, the heat of the smoke escaping from the *boiler* is less on the average than that from the *furnace*. The hot-water boiler is especially economical in this regard. The second cause is the comparatively small loss of heat by open windows or doors for regulation, where the heating is done by steam or hot-water heated currents, to that which occurs with the fervid heat emitted from hot-air furnaces.

Ventilation, however, and ample ventilation, is not attained except at the cost of fuel. A comparison between the process of heating by hot-air currents and by ventilating currents can readily be made. A certain volume of hot air suffices to be the vehicle for transporting the heat from the fuel to a room; this air is heated to such degree that it will impart the desired temperature in the process, its available heat for this purpose being what the air is heated above the average temperature of the room; and there must have been expelled from the room just as much air at the average temperature to allow the heated air to come in. The actual loss of heat by using this air as the vehicle of transmission, is what was expended in heating the air originally from whatever external temperature it was first taken into the apparatus, to the temperature of the room, at which it is wasted into the external air again. This proposition is true alike for highly-heated currents with small volumes, or for ventilating currents with large volumes. The quantity of heat to be imparted in the room to cooling walls or windows is practically constant, the quantity of heat *lost* by the apparatus varies with the volume of air passing it, which volume is to be taken as having been heated from the external temperature to that of room.

A certain school-room, when the outside thermometer stands at zero, may be kept at the temperature of 70° by introducing 150 cubic feet of air heated to 250° each minute. There is thus dispersed in heating 180° temperature that has been abstracted or taken away from 150 cubic feet each minute, or 27,000° cubic feet. If we suppose in place of 150 cubic feet there is given for ventila-

tion 1,000 cubic feet each minute (50 scholars and 20 cubic feet each minute), it then happens that only 27° excess of temperature is demanded, and the heat of the influent air becomes 97° in place of 250°. But there is wasted each minute, in the one case, 150 cubic feet of air at 70°, which has been heated up from zero, = 10,500° cubic feet, and in the other, 1000 cubic feet at 70° = 70,-000° cubic feet, or $6\frac{2}{3}$ times as much heat in case of ventilating as in the case of simple heating. Again, the ratio of dispersed heat to waste of heat, with the hot currents, was 1 to 0.4 nearly, while the same ratio with ventilating currents was 1 to 2.6 nearly. And this condition is even worse when heating in milder weather. Suppose the outside temperature to be 40° and the room to be kept at 70°, and suppose the same 150 cubic feet of air to be heated to 140°, here there is dispersed 70° of heat or 10,500° cubic feet each minute. Let it be supposed that in place of the 150 cubic feet, there is given for ventilation 1500 (50 × 30), it then becomes requisite, to provide for the heat to be dispersed, that only 7° should be added to the heat of the entering air above the heat of room, and 77° is all that is needed for the temperature of this mild air current. [All considerations of heat of pupils have been omitted in this rough exhibit.] But there is wasted in the one case 150 cubic feet of air at 70° heated from 40, = 30° × 150 = 4500° cubic feet, and in the other 1500 cubic feet × 30° = 45,000° feet, or ten times as much. The ratio of dispersed heat to the waste of heat with hot currents in this last case was 1 to 33, while the same ratio with ventilating currents was 1 to 4.3.

The total quantity of heat to be imparted to air for this single room in coldest weather (following the above suppositions) is for hot-air currents 37,500° cubic feet, for ventilating currents 97,000; and for mild weather, with hot-air currents 15,000° cubic feet, or with ventilating currents 58,500. The relative dimensions of boiler and of heating or so-called radiating surfaces for the two apparatuses, *and, in cold weather, the consumption of fuel*, are determined by the 37,500 to 97,000 values.*

Although these figures have been made on supposed bases, and

* The above assumptions are comparisons of hot-air furnace currents with steam or hot-water heated currents. If we take steam-heated *hot currents*, about 160° is the highest supposable temperature, when there will be demanded 300 cubic feet of air to carry the needful excess of temperature to the room, and the ratio of the two supposed high and low temperature apparatuses, in their respective boiler and heating surfaces, and in fuel consumed, becomes 48,000 to 97,000. In warmer weather, the ratio of fuel consumption becomes yet more unfavorable for the low temperature apparatus.

are only approximations towards the real facts of dispersed or loss of heat in or from the room, yet they are perfectly reliable indications of the results of hot-air current warming compared to ventilating current warming, and the proportions established have been borne out in numerous cases. It is evident that ventilation is not economic as a process of warming. The writer has examined many buildings where, after a demonstration of successful ventilation, the working of the apparatus has been permitted to degrade to the barest warming. This has been particularly the case in hospitals where forced ventilation has been provided by a fan driven by its own independent engine. In such cases it may be said to be a not unusual result that the fan gradually falls off in speed and finally ceases to run, until after some lapse of time, some new broom is instituted to revive the ventilation. In one of our largest eastern cities the economic result of stopping the fan in a general hospital was made the matter of boast by the administration, and finally led to its removal and the substitution of a self-acting system, which latter—alas for the economy!—proved equally costly to operate and scarcely so effective to regulate, as was the older plan.

But in the case of a school-room, the occupancy of the building is restricted to less than one third the time on week-days, and including Sundays, to but about one-fourth the whole time; so that by judicious attention from the directors of the school the great expenditure of ample ventilation, in fuel and heat, can be materially cut down by disuse of ventilation except at essential times. To effect this purpose the great air supply for the whole building should be regulated to meet the condition of occupied or unoccupied. And it is to be recommended that the effluent shafts be dampered (in the usual way that chimneys of factories are regulated) to reduce the pressure of cold air upon the building when the air-supply is mainly or partly closed off.

Careful and judicious management of such an apparatus as is proposed is requisite at all times and seasons, not only with a view to economy in the use of fuel, but also to render efficient the primary object of thorough ventilation. It has been accepted that if 30 cubic feet of fresh air each minute be supplied for each scholar when the schools are in session, the requirements of healthful ventilation will have been met. This volume, however, has been established rather by reiteration of writers on the subject of ventilation than by any sound argument. It has all the authority

of an average of suppositions, being merely what is guessed to be sufficient to render the vitiations from one person to become endurable. The real quantity of air impaired by any one individual in a state of comparative rest each minute is absurdly small compared with this volume. Only about one-third of a cubic foot of air is vitiated by breathing (inhaled and exhaled) in one minute's time, and even this is not entirely spent for use over again. There is a quantity of air vitiated by transpiration from the person. Probably a breathing action goes on in some manner from all parts of the skin; an absorption of oxygen and exclusion of carbonic acid, moisture, and organic vapor or organic particles, similar to that occurring from the lungs, and there is certainly a transpiration of moisture laden with organic matter, in considerable but very variable amounts. On the whole it seems safe to say that the ventilation would be absolutely perfect if there could be removed, without admixture of other air, the volume of air exhaled in breathing, together with a layer of air next the person, and the two volumes were taken to be one cubic foot of air per person; while at the same time there should be furnished the same quantity, to answer the double purpose of supplying fresh air for inhalation and a new "atmosphere" next the person. For the purpose of supplying a desired or desirable *mixture* of fresh and vitiated air we use 30 cubic feet of the former, where the *requisite* is the *substitution* of a single cubic foot of fresh air for a single cubic foot of foul air!

The same course of argument applies to a room full of vitiated air with equal force that it does to a single individual whose vitiation is to be removed. One single displacement of the entire volume of air in any room, to take place after each session, is more efficient in the removal of vitiated air than an hour's "systematic" ventilation of the most approved kind. Our ventilating quantities of air and elaboration of sizes of ducts and flues, our discussions as to force of impulse for affecting the supply or inducing the escape of air, all pass for little, compared with the volume and dimensions of the current or the motive force proceeding from a pair of open windows, with a fresh northwest wind. The distribution of current in the room need not be investigated; an instant's sweep will freshen the whole room. The expenditure of fuel in reheating the room in the coldest weather after such a respiration is far less than would be demanded to obtain the same degree of purity through intermixture of currents from the apparatus.

Without the aid of the wind, and at times and seasons when activity of the circulation in and out of the supposed open windows would be least, the freshening of the air of an opened school-room by diffusion alone would surpass the ventilating effects to be produced at any reasonable cost in fuel by the best designed or most judiciously manipulated apparatus. It is scarcely possible to attach too great importance to this method of evacuation of vitiated air, as a part of the system of operation of the proposed apparatus, beside its great advantage in the economy of working, as in this way the supply of air in large volumes can be suspended for the most of fourteen or fifteen hours between the sessions on any two following days, and from thirty-eight to thirty-nine hours from Saturday to Monday.

§ The writer believes he has now pretty nearly followed the main questions, which a study of the plans and methods proposed for warming and ventilating this school-house have presented to his mind. Two incidental points, however, offer themselves, about which it seems to him proper to remark.

The first point relates to the arrangement and ventilation of the clothing-rooms. They should be of ample size, well lighted, airy, well warmed, and above all, well ventilated, and they should have impermeable side walls and perhaps ceilings. Not at all unfrequently the school clothing-rooms have none of these requisites. The requisite of dimension is that which will give independent hanging room and places for each of the garments of the fifty scholars supposed for each school-room. Contact of garments may be tolerated, but not packing, and it would be better to avoid contact. Light is the sole reliance for order and cleanliness. Air or ventilation should remove all personal odors and carry away any evaporation from damp clothing, and for ventilation it may be suggested that 4 or 5 cubic feet of air per scholar per minute will not prove excessive. The impermeable painted walls are needed to prevent the gradual accumulation of organic matter that will have been transported into porous plastering by evaporation from clothing, which organic matter becomes offensive, and in time creates a pervading and unhealthy odor.*

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*One of the incident troubles of the system of moderately-warmed rooms is found in the incapability to impart heat to any person coming cold into a room with desirable promptness. The difficulty is especially attached to children having cold or damp feet. It has been suggested to provide in the hall, for use in cold or wet weather, areas of heated flooring, and such a provision seems to be worthy of consideration by the building

The second point is the closets. Like the clothing-rooms, these should be of ample size, well lighted, airy, well warmed, and above all, well ventilated. For the ventilation, the propriety of removal of all the air at or near the seats is almost too obvious to need mention. The place of admission of air is more difficult to stipulate, but if possible it ought to be entirely by means of the doorway from the corridor, or hall, while the heat may be then applied by direct radiation. The danger of having hot air flues entering a closet is that the hot-air flues may overpower the ventilating flues and an outward current of air may be established from the closet into the building. There is one more requisite: they should be well, not to say highly, finished. It is urged upon the Committee that care be taken and expense incurred to make these rooms show-rooms, in light, in finish, and in general nicety. It is not extravagance to specify and expand reasonably upon what is so conducive to the moral as well as physical welfare of the children, and it would be a trifling addition to the gross cost of the proposed structure to provide for these rooms tile floors, white marble division plates, enameled brick walls, and generally to fit these rooms up with substantial elegance.

§ In finally concluding this report it becomes necessary to say that it is not the mere question of the system of distribution of the air currents which was the occasion of this discussion, upon which the success or failure of the ventilating and warming of this school-house will depend. No one cause has been the general reason for failing to attain a standard of accomplishment; for instance, a supply of 30 cubic feet of air per scholar per minute in school-rooms. The inlet flues, the outlet flues; the air-chambers and ducts; the air-shafts and wind cowls; the means of control and the control itself; the kind of heating apparatus; and, if steam or hot-water, the boilers and radiating surfaces; all of these, any one of which may be deficient, must be, if not perfect, at least practically operative, to secure the success of the apparatus.

No attempt has been made in this paper to set forth or to dis-

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committee and architect. If the heating apparatus be a hot-water one (and a subsidiary hot-water circulation can be formed below the level of the water with steam-boiler), the regulation of temperature of an iron slab to degrees of heat which will not injure wet leather or india-rubber becomes, by means of a transfer circulation, very easy. With a steam apparatus a flat coil of steam-pipe laid in a sand-box covered by an iron plate, or preferably a similar coil of steam-pipe upon which is laid a very heavy iron plate 2½ to 3 inches thick, will form a piece of standing floor of the requisite temperature.

cuss dimensions or proportions of apparatus or adjuncts, or to specify either mechanical or architectural details pertaining to the warming and ventilation. Even the designation of the requirements of performance, and the qualifying conditions of apparatus, with sufficient argument to support assertions, has led to this extended report. With the conclusion of the Committee to accept the plans of a competent architect, and to adopt definite methods for warming and ventilation, they can properly rely upon him for whatever comes within the field of his professional skill.

While it is beyond the scope of inquiry devolved upon the writer to consider either the architectural effect or the adaptability of the plans for educational purposes, he may be allowed to congratulate the Committee upon the promise of successful results in both these regards which the following of them will ensure.

The plan for ventilation and warming, however, presents some noticeable advantages of high value. In the basement, the air passages and chambers can be made to occupy the central or dark portion alone, and can thus be isolated from the rooms completely and altogether. One light room of the cellar should be given to the apparatus as a boiler-room, and possibly one or two others may be used for storage of fuel, but the general basement will become available for the purpose of the school. In the stories above the basement, the positions of the several flues present unusual facilities for grouping them into one or two shafts, whereby the essential control of these flues can be secured. Every constructor or operator of steam or hot-water heating apparatus is aware of the difficulties of extended circulation—difficulties in a great measure avoided by the compact disposition admitted by these plans.

The lesson of improvement of the ventilation of school-houses has greater public importance than the construction of a suitable school-house at Bridgeport. If, after full consideration of the best lights procurable, the Building Committee conclude that, with reasonable economy, they can adopt the methods recommended, they will have their warrant and justification with the community at large, and with the voters of Bridgeport.

SEWERAGE PROBLEMS:

THE

Intercepting Sewer for Hartford.

REPORT OF SPECIAL COMMITTEE,

WITH COMMENTS;

The Sewerage of New London.

BY

C. W. CHAMBERLAIN, M.D.,

SECRETARY OF THE BOARD, MEMBER OF ADVISORY COMMITTEE AM. PUBLIC HEALTH ASSOCIATION, ETC.

WITH

REPORT OF COL. GEO. E. WARING, JR.,

SANITARY ENGINEER.

THE SEWERAGE OF HARTFORD.

The sanitary questions involved in the plans for relieving the Park river from sewage pollution are of such general interest that their discussion finds appropriate place here. It is moreover intended to present in these reports as faithful an account as possible of all sanitary improvements in the State, and from time to time illustrate such topographical details as are of interest. The accompanying maps show the valley of the Park river and of some of its tributaries, in its course through the city. The commencement of its water-shed was shown in that part of New Britain included in the map of the area of the Quinnipiac, last year. It is hoped to illustrate its whole course later, in connection with a study of the river basins of the State. The sewerage map of the city also forms a valuable contribution to the sanitary history of the State, and is of permanent value in the study of the development and advance of such work in the State. As the State Board of Health was represented on this special committee by its Secretary, it is all the more appropriate to publish the result of their labors. Our thanks are due to the committee for their consent to use all or such portions of the report as might be of service, and for tracings of the maps, which, with some alterations, are as prepared for them. The data for the construction of the maps was, to a great extent, in the Street Commissioners' Office, and in that of the City Engineer, Mr. C. L. Bunce, and obligations are here acknowledged once for all, for all information thus derived.

The map illustrates the division of the city into drainage districts. Although contour lines are not given, the elevation of the streets and sewers will show sufficiently the natural boundaries these follow—so further discussion of that part is not necessary.

The question under discussion may be briefly stated as follows: There is in the center of the city a rather sluggish stream; generally fed, however, by mountain brooks, which in heavy rains swell its current rapidly to many times its ordinary volume, and

more than double its ordinary velocity. This stream is several times in its course ponded by low dams, the highest not more than six to eight feet. The nature of its bed is shown in the accompanying profile. This stream, in its course, runs through the park, hence its name. During the last few years it has become more and more contaminated by sewage and manufacturing waste. One of its tributaries, Gully Brook, is an elongated cesspool, much more contaminated than the river itself. The sewer to relieve the pollution of Gully Brook is, however, under construction, but only to pour its contents directly into the river, instead of first into a sluggish, obstructed brook. This, however, will be some improvement, as the sewage will not be already half putrified when it reaches Park river. The dams before mentioned are, unless by act of Legislature, not under control of the city, and throughout several months of the year the sewage is ponded behind them, an area for settling all matters held in suspension provided, as well, for evaporation under the hot suns of midsummer. As a natural consequence, decay goes on rapidly; often the bed of the pond along the margins is exposed for a greater to less extent; in dry seasons two-thirds or more of the bed of the pond is uncovered. The effect of such a state of affairs can be easily imagined. When the water is high the evils are comparatively small, but usually in summer and fall the condition is, to say the least, not sanitary. The question then arises, how shall this condition be remedied?

There is at the mouth of the river a deposit of mud and quicksand that has been brought down by the stream when rapid; the depth of this is unknown. At the Valley Railroad bridge piles were driven repeatedly, and finally they were closely wedged together, and then the pier built upon them, so that the bridge is really a floating bridge; the piles upon which it rests do not touch bottom, as I have been informed. This is stated to show the nature of the mouth of the river; the bridge of course is built according to engineering principles, and is as solid and strong as if the piles rested on granite. Now if, as has been proposed, the river were to be used as an open sewer, the city removing or controlling the dams, this bar at the mouth of the river would be of the heavier sewage, and partially uncovered at low tide, would be a reeking nuisance, as bad, if not worse than the present condition of the river; by narrowing the channel and flushing the river occasionally, a ditch would be cut through this deposit merely, but the

mass would remain. Moreover, the bank of the river for a considerable distance would be polluted by a similar deposit.

The intercepting sewer proposed would be open to none of these objections, as its outlet would be carried out into mid-channel, where everything would be carried along swiftly, and long before anything would drift to the banks a more or less complete oxidation would have taken place, or, at worst, the deposit would be far below the city limits. Using the river as a sewer, all that is now ponded behind the dams would be carried to the outlet, and the deposit correspondingly increased, so that at shoal water, if not at other times, a sewage-polluted mass would be exposed to the sun and air, its emanations to be swept over the city, and that too, every day in the year except at high water in the river in the spring. Another objection to using the river as an open sewer is, the blot upon the beauty of the city to allow a vile, polluted stream to flow through its very heart, and continually call the attention of strangers to its noisomeness. Again, the park is the breathing-place, so to speak, for the poor; where the weary mother takes her infant from some crowded tenement-house to secure pure air to aid in its struggle against the disease that has threatened its young life, and in the scorching heats of midsummer from her stifling attic-room, seeks the shade, and the air, cooled by this running stream. If an open sewer, would its emanations be life-giving or beneficial? As the city increases in size, the greater will be the value and necessity of this park for this purpose, and eventually the river will be purified. As before stated, in an æsthetic sense alone, the purity of this stream is demanded, and is one of the inevitable gifts of the future.

The unreliability of reservoirs in securing an unfailing supply of water in a dry season is pretty well known to all the inhabitants of this city, and the mere fact of a series of dams will not secure a certain supply whenever wanted, so that in a very dry season when the sewage evils are at their very worst, upon the open sewer plan, there would be no supply of water to constantly flush this long sewer, and a greater evil will result than the one sought to be remedied.

The following account of the sewerage of the city, and discussion of the plans of relief, is taken from the report of the committee, with such omissions and additions as seemed expedient.*

* Report of the Board of Street Commissioners, Health Committee, and Joint Special Committee of the Court of Common Council on the Park river nuisance. Prepared for the committee by C. L. Burdett, C. E.

The first public sewer in Hartford was built in Ann street, at a cost of $840, in 1844, and between that time and 1855, when the Connecticut river water was introduced into Hartford, thirty-two sewers were constructed.

The system that has been in use in this city, from the date of the first sewer to the present day, is known as the English, or "water-carriage" system; in which the sewage is mixed with a large proportion of water, and carried in pipes or sewers to a convenient outlet.

Before 1855, the wells and springs, and the water distributed from Babcock farm in wooden logs, (some of which have recently been dug up on Main street,) furnished the supply of water for diluting and removing the sewage from dwellings and streets, and since 1855, with but few exceptions, the supply of water has been ample for that purpose.

From data obtained from Superintendent Murphy, of the Hartford Water-Works, it appears that the daily water-supply during June, July, and a part of August, of this year, averaged 130 gallons per head.

It has been said that Hartford has no sewer system, but that seems to be an error, at least in part, as a study of the sewers, as built, shows in each of the sections into which the city has been divided in the effort to dispose of sewage, a trunk, or large sewer, and smaller branches or laterals, radiating from this trunk, and diminishing in size to their origins.

The mistake in applying the system, and the faults of design or workmanship that may exist, are outside of the question under consideration.

The plan has been to conduct the sewage by the readiest way to the nearest brook or natural stream, draining the slope which sought relief. The instances are rare in which a sewer has cut through a ridge to discharge into another basin.

Between Avon street and Arch street, east of Main street, the sewers find a ready outfall by a direct course to the Connecticut river, but in other parts of the city the brooks or the open meadows receive the sewage.

Up to the present time, Hartford has built 39.8 miles of sewers at a cost of $530,000, and the growth of the city in territory and population already demands additional expenditures.

Of the 8,358 acres within the city limits, 5,100 acres are comprised in the Park river basin, and the sewage from this section

flows into the Park river through 29 sewers, of from 18 inches to 10 feet in diameter, twenty of these entering from the north side, and nine from the south. In addition to the New Britain sewage, which empties into the south branch, the discharge from the main sewers in Asylum avenue, Farmington avenue, Laurel, Park, Broad, Hungerford, High, Asylum, Trumbull, and Main streets, and from a large number of private drains, the sewage from 551 acres of occupied land is poured through Gully brook and the culvert to Park river, and in this stream the ponding of the water by the dams has caused the deposit of large quantities of filth, until the river is little better than a large uncovered cess-pool, in which, under the heat of the sun, decomposition and fermentation of sewage are constant conditions.

POLLUTION OF PARK RIVER.

An examination of Park river during August last showed its ordinary condition during the summer months. At the Connecticut river where the water was 7.6 feet deep, the bottom, 5 feet below the city base, was of mud and clay, covered in places with stone and gravel. The piles supporting the Connecticut Valley railroad-bridge were driven about 30 feet without striking rock. Near the Front street bridge, 2,600 feet west of the Connecticut river, a ledge of rocks appears in the river bed, and rapids occur at intervals to the saw-mill dam, where the grade is 5.8 feet at the bottom, and 12.3 feet at the crest of the dam.

This dam sets the water back to a point west of Main street, where the ledge and the rapids again appear, near Daniels' dam, which is 4,240 feet from the Connecticut river, and its crest is at a grade of 21.3 feet.

The water in the saw-mill pond is dark in color, filthy in appearance, and offensive in odor. Sewage, dead fishes, and vermin float about on the surface, and are swept to and fro by the wind.

The shore near Sheldon street is about two feet above the river-bed, for half the width between high banks, and on this shore garbage is thrown down in places in large heaps, and sewage from drains spreads along through a rank growth of weeds, over stones coated with slime.

At 8,000 feet from the Connecticut the ledge appears again near the N. Y., N. H., and Hartford railroad shops, and between Daniels' dam and this point the bottom of the river seems to be very soft, and covered with a deposit that gives off large quantities

of gas when slightly disturbed. The water ponded here has no better appearance than that in the pond below.

At Mulberry street the average depth of water is 3.6 feet; at Trumbull street, 4.3; feet at Ford street is 1.6 feet; and at the Park bridge is 2.4 feet.

From the point near the railroad shops to Sharps' dam, which is 10,500 feet from the Connecticut river, the ledge and rapids appear.

At Capitol avenue bridge the average depth of the water is 3.1 feet, and at Laurel street is 6.6 feet, and the channel depth is 10.4 feet.

The river forks at 13,880 feet ($2\frac{5}{8}$ miles) from the Connecticut river, and from Capitol avenue to this point the water, though dark in color, seems free from odor, and not very foul; but in the north branch, at the outlet of the Laurel street (Nook Farm) sewer, the water is ponded by a bar which forms a natural dam, and there the pollution is apparent and offensive.

From Laurel street the bed of the stream rises 1 foot in 180 to Capitol avenue, and from there falls 1 foot in 480 to the Connecticut river.

The water ponded by the dams accumulates impurities from the constant flow of sewage, and it is purified but little by even a heavy rain, as the current fails to reach and scour out the foul deposits on the sides and bottom of the river.

In the center of the city, in addition to the filth deposited on the banks of the Park river, there is a surface of about $9\frac{1}{2}$ acres (415,000 square feet) of foul water, giving off for many hours of the day the dangerous products of fermenting and decomposing sewage.

When it is considered that this evil is growing, the necessity for a remedy is obvious. For it is taken as granted that the serious injury by this state of things to the health of the people of Hartford is beyond question.

PLANS FOR RELIEF.

HIGH AND LOW LEVEL SYSTEM.

It has been suggested that by dividing the sewers into a high and low level system, by intercepting sewers that would cut through the dividing ridge at Main street, near the tunnel (for the north section), a large portion of the sewage might be diverted from Gully brook, and so from Park river.


PLAN of PARK RIVER
Showing outlets of present Sewers
and location of a
PROPOSED INTERCEPTING SEWER
Scale 400 ft to an inch
Chas L Burdett, Civil Eng.
1880
Notes
Present sewers are shown by dotted lines
Proposed sewer is shown by a broken line
Figures show heights above City Base and size of sewers. Figures underlined show heights of sewers above City Base
PARK RIVER
NORTH BRANCH
SOUTH BRANCH
CONNECTICUT RIVER
FARMINGTON AVE
ASYLUM ST
PEARL ST
CAPITOL AVE
PARK ST
Capitol
The New Britain sewage flows in this branch
PROFILE of PARK RIVER
Horizontal Scale - 400 ft to an inch
Vertical - 40
Freshet of 1854
Summer Level

But the difficulty of finding a proper location for the crossing, the fact that a large section west of Gully brook can be drained only by a low level sewer near the brook, and the necessity for still providing an outlet for at least 50 per cent. of the whole sewage by the present route to Park river, effectually dispose of the plan, on the score of economy.

The same objection applies to the application of the plan to the section south of Park river.

The remedy seems to lie in taking the outfalls of the sewers as they exist, and applying the correction in or near Park river.

SINGLE AND DOUBLE SYSTEM.

At the sides of most of the Hartford streets that are sewered, catching water-basins or wells are built and connected with the sewers to take the drainage from the streets during rain storms, and the amount thus collected has been in most cases allowed for in determining the size of the sewers.

In the system where all rain-fall is excluded, and the sewers are constructed to carry house-sewage alone, they are comparatively small, and are built at an apparently small expense.

As the Hartford sewers have been built to carry a certain per cent. of rain-fall, any intercepting sewer that may be built should be designed with this fact in view, unless it may be intended to introduce a new system, by commencing with a small trunk, and gradually extending the "double" system, and laying the new branches for the house-sewage, and using sewers now built to carry storm-water only.

This plan would be carried out at a sacrifice of much of the old work, that has cost individuals at least $200,000, in addition to the $530,000 assessed and expended by the city.

(The question of the availability of small sewers has perhaps been demonstrated by their satisfactory use at Memphis. There has been, however, one point demonstrated there that indeed was well known before, that there must be a plentiful water supply to flush them, else they become foul. As it has been impossible to go through any summer yet without recourse to the pumps, this additional tax on the water supply is for the present certainly out of the question, and, indeed, for all time, unless some other source of water supply is sought, for it is not probable that the source now depended upon will be more than met in the increased wants arising from the natural growth of the city. Thus, if there were no sewers at all, the construction of small pipe-sewers might well be reconsidered, but with the deficiencies in the

water supply, and also the fact that in many instances the house-drains are larger than the proposed drains, involving great expense and trouble to change, it appears out of the question to seek relief in this way. Moreover, the forced ventilation of the soil-pipes in every house could not as readily be secured here, as in case of the carrying out of a new work in an unsewered town, however desirable such action may be. Therefore, while fully believing in the separation of storm-water and sewage, and in the superiorityof the small sewer system, the general opinion of the non-feasibility of the change for this city was accepted).

THE REMOVAL OF THE DAMS.

It is claimed that by removing the dams in Park river the water will be maintained clear and innoxious by allowing the river an unobstructed flow to the Connecticut river; and this might be the result if there were sufficient supply of water at all seasons to insure a large dilution of the sewage.

The slope of the Park river bed from Capitol avenue to the Connecticut river is 1 foot in 480 feet, and to maintain a constant flow of 1 foot in depth for a width of fifty feet, a water supply of about 350 cubic feet per second is necessary.

From measurements at Daniel's dam in 1874, the mean discharge of Park river was found to be 139 cubic feet per second, and the least discharge, 25 cubic feet per second; which is only enough to maintain a narrow thread of river. And as 4.2 cubic feet of sewage enter the river per second during the dry season, the dilution will not be more than six (6) parts of water to one part of sewage; while twenty parts of water to one part of sewage, for a slow-flowing stream, is given by Mr. Hawksley as the lowest safe ratio of dilution.

The present river bed is saturated with decaying sewage, and the pernicious effects of the exposure of this matter by what would amount to the abandonment of three-fourths of the present river bed, can best be shown by the evil results in places where similar experiments have been tried.

Even though the supply of water were sufficient for the purpose desired, the cost of the mill privileges that would have to be bought would be a large item in the expense of the plan.

As an argument in favor of this plan of maintaining the river as an open sewer, attention has been called to the fact that one city at least has a nearly stagnant stream of foul water in its midst, that receives the surface drainage and that from a few sewers, and that no ill-health has arisen from this source.

But this is hardly a parallel case, as the city in question (Baltimore) has but few sewers, the faeces and refuse being removed from vaults by hand labor; and the water of Jones' Falls, though impure, cannot approach in filthiness the Park river, Hartford, where the sewage from five-sevenths of the occupied territory, and of at least half of the inhabitants, is ponded in the heart of the city.

PLAN FOR CONSTRUCTING MORE DAMS, AND ALSO NARROWING THE RIVER BY RETAINING WALLS.

This plan involves the cost of constructing the retaining walls, two or more dams with flush-gates, the building of flush-gates, and repairs at present dams, the damages resulting to the water privileges and from flowage.

The distance from Front street to Sharps' dam is 7,900 feet, and if walls were built on both sides of the river, the total length will be 15,800 feet, and the cost close upon $54,000.

The amount of damage done from injury to the mill privileges and from flowage is uncertain, and can probably be ascertained only by decision of arbitrators and the courts; but they will no doubt be large enough to form no minor item in the sum total.

But the points to be examined more carefully are the utility of the plan, and the possibility of carrying it out.

It has been shown that very little water flows in the river during the dry season, and that the amount ponded is at least one-seventh sewage.

At the time when the cleansing is most needed it will be injudicious to draw largely upon the ponds for flushing, as there will be no certainty when they will again be filled, and a large quantity of water will be needed to maintain the velocity required to remove deposits.

By ponding the sewage, deposits are formed, and in this, as in all sewers, the great principle to be carried out is, that the sewers when once cleaned should be kept free from deposits.

"In introducing flushing arrangements in which the sewage itself is to form the motive power for flushing, care must be taken; otherwise it will be found that the damming up of a volume of sewage for a considerable time will lead to the deposit of sedimentary matter, which, when the flushing-gate is open, will accumulate some distance below it; and for this reason it will be well to combine in the system more than one mode of effecting the flushing. Sewers are more readily cleaned with pure water than with sewage."

To make the plan effective a generous supply of fresh water should be made available, and if that were possible no great change need be made in the present arrangement of dams in the river,—it would solve the problem at once.

SEWER IN THE BED OF PARK RIVER.

For 7,900 feet of the 10,500 feet from the Connecticut river to Sharps' dam, the bed of the river is a ledge of rock, and to protect from ice any sewer (either of iron or brick) that may be built in the river bed, it should be sunk in a trench, and bedded in, and covered with cement. The work must be done in a place liable to flooding by heavy rain-storms that may occur at any moment, and that would stop the work, and imperil and destroy that already completed.

The sewer would require an artificial foundation for about 2,600 feet from the Connecticut river west, and its exact cost can be determined only by a thorough examination, by borings, of the character of the soil for this distance.

If the sewer follows the grade of the river bed, the grade of the invert of the outlet will be at about seven and five-tenths feet below the city base.

Above Sharps' dam a suitable location for the sewer can be found on the river bank. Starting, as in the previous plan, from Sharps' dam, a good rock foundation for a wall will be found for eight-tenths of the distance to the Connecticut river, and for the rest of the way an artificial foundation must be built. The wall would be built about ten feet out from the river bank ; and back of the wall, and between it and the present bank, the sewer would be placed, and earth filled in over it, and turfed.

Connections with this intercepting sewer and the present sewer mains must be made across the river bed.

LEVEL OF OUTFALLS.

Keeping in mind that the aim of the "water-carriage" system is to secure the prompt removal from dwellings of all refuse before it shall have time to begin any dangerous fermentation, it will be seen that whatever tends to retain the sewage in the pipes, or to delay the discharge, and induce back-water from heavy storms or floods, is to be carefully avoided. Whenever from a deposit in the sewers they are clogged, or their outlets are sealed by flood, there is danger of back-water in cellars from the house drains ;

and if a rain-storm occurs at such times, the cellars are sure to receive a deposit of sewage that is set back, and forms a most fertile source of disease and suffering.

"The residents on a line of sewer, having paid their tax for improvements, expect to be benefited by it, and, that they shall not be disappointed in this very natural expectation, the outlet of their sewer should not be sealed by the tide."

"From a mistaken view of the purpose to be secured by a proper system of drainage, the tendency appears to be constantly towards placing the outlets of sewers at a too "low level."

The following tables, computed from Generals Warren and Ellis' report on the Connecticut river, are of value in determining the proper level of the main outfalls of the sewers.

By the list of floods from 1801 to 1874, it appears that of fifty freshets the highest (1854) was 29.83 feet above low water, the mean height was 19.76 feet, and the least 12.25 feet.

The average duration of the highest floods from 1871 to 1877 was 7 days; and in 1873 the water stood for 46 days above 12 feet, and for 48 days above 10 feet.

TABLE No. 1.

Average of 7 Years.	Height.	Discharge cu. ft. per sec.
Connecticut river stood 318 days,	2 ft.	6,500
133	4	
206	6	17,600
85	8	
56	10	36,600
37	12	47,200
9	16	
3	20	101,100

CONTINUED FRESHET.

Water at 12 ft. and over.	Year.	At 10 ft. and over.	
31 days	1871	32 days	
28	1872	31	
46	1873	48	
22	1874	26	
18	1875	46	interval of 3 days.
37	1876	63	" 2 "
9	1877	15	
—		—	
Average, 27		37	

These heights are referred to the United States base, which is about 2 feet above the city base, so that 10 of the United States equal 12 of Hartford grade; and it is seen that for an average of 37 days the water stands at and above 12 feet.

By this it would seem that any intercepting sewer that may be built should have the invert of the main outlet at a grade not below 12; and by providing a branch outfall for service during low water, this grade of 12 for the main outfall may be easily maintained.

RAINFALL.

As provision is made for the discharge by the sewers of a portion of the rainfall, a knowledge of the amount of rain, and of the duration of the storms, is important in determining the size of the sewers in any district.

From a large number of observations, the frequency of rainfalls of one inch per hour has caused it to be adopted, in Europe and this country, as the maximum to be considered in designing sewers.

The still more important ratio of the time of the discharge of the storm waters to the duration of the storm has been taken as 2 to 1. That is, a rain of 1 inch in 1 hour will take 2 hours for discharge through outlets.

This ratio depends so largely upon local considerations that it is deemed of sufficient importance, as an element in the present case, and as of value in future estimates for drainage of any part of the city, to prepare the table in Appendix B, mainly from observations made by Prof. John Brocklesby, of Trinity college.

INTERCEPTING SEWER.

On the map accompanying this report is shown a plan of the Park river and vicinity, a profile of the river bed, the outlets of the sewers which empty into the river, and also the line of an intercepting sewer which is located in a position which, after a careful study of the ground and the requirements of the case, appears entirely feasible. The proposed sewer begins at the Park street sewer, at a point about 200 feet west of the river, and, running northeasterly along the left bank of the south branch, crosses the north branch at the curve in Riverside street, and joins the extension of Laurel street (Nook farm) sewer; thence easterly along Riverside street and extension to a point near the left bank of Park river, where it curves to the north, following the bank

near the water past the ice-houses, intercepting the Capitol avenue sewer, and just above Sharps' dam turning south across Park river, and following the right bank back of a retaining-wall for about 400 feet, at Weed's factory, intercepting the Lawrence, Flower, Broad, and Hungerford street sewers, and at the Park passing back of the retaining-wall for about 800 feet to a point near the site of the old Imlay Mill ; thence continuing along the Park bank to a point west of and near the stepping-stones, where it crosses Park river, and joins the Gully brook main.

The sewer thus far is about 8,500 feet in length, and for about three-eighths of this distance it is on private land, but in such a location as to damage the property but slightly.

From Park river to Riverside street the land where the sewer passes (between the high bank and the river) is valuable only for pasture, and from Woodbine street to Capitol avenue the sewer follows close to the water, about 200 feet back of the houses, where the grade of the river is about 8 feet above ordinary water-mark in the river, and affords ample cover for the same.

The land east of Sigourney street and south of the railroad tracks, to Sharps' dam, and from Flower street to the Park, is unoccupied, and at the Weed factory, except for about 400 feet where the sewer could be built back of a retaining-wall, no difficulty will be experienced in securing a suitable line.

If there are any objections to building back of the present retaining wall at the park, a new one can be built outside of it, and the sewer placed between the two walls.

The proposed sewer starts from the Park street sewer at grade 33.5 feet above the city base, joins the Laurel street extension at 30 feet, intercepts the Capitol avenue sewer at 28 feet, Lawrence street at 23 feet, Hungerford street at about 22 feet, and Gully brook at 18 feet, giving an average inclination of 1 foot in 516 feet, which gives a velocity of 3.8 feet per second in the 36-inch sewer, 4.5 feet per second in the 48-inch sewer, 4.8 feet per second in the 54 inch sewer, and 5 feet per second in the 60-inch sewer.

According to DuBuat, a velocity of three feet per second is sufficient to move angular stones of egg size, and the velocity in the proposed sewer, while sufficient to remove ordinary deposits, can be increased at every interception by making proper junctions, as most of the connections will be made where a great velocity in the present outlet is given by a sharp descent.

At or near the junctions of the main-service sewers with the intercepting sewer, provision should be made for an overflow of water which floods the sewers during heavy rain-falls, and this can be done by a plan which depends for its success upon the higher velocity of the water when sewers are running full, which causes it to leap an opening into which the ordinary flow would pour, or by building openings or weirs in the side of the sewer above a certain level, and at places where suitable outlets for the overflow can be obtained.

At the High street and Main street junctions (north side), however, gates to close the weir for overflow may be built, in order to make the sewers continuous from North Main street with the intercepting sewer.

From Pleasant street to Park river, the Main street and High street sewers have no laterals, and, by utilizing the flow from this limited water-shed, ample velocity for flushing the intercepting sewer can be obtained.

By reference to the sewer map it will be seen that the Main street sewer starts at Pleasant street, at grade of 63.5 feet, and that will give at Park river a head of 48.3 feet, and at Connecticut river 51.5 feet, in the intercepting sewer.

In excessive rains the overflows should be all opened and the main relieved.

In Table No. 2, the cutting required at Prospect street is stated at 20.1 feet, at Main street, 30.2 feet, and at Daniels' mill 15.8 feet.

It will be advisable to tunnel under Main street, but only for a distance of about 350 feet, and, in the absence of borings, the material to be cut cannot be certainly known.

Near the corner of Pearl and South Ann streets, the rock ledge is at a grade of 0, at Daniels' dam (in Park river), grade of about 15 feet, and in Arch street (opposite Lincoln's foundry), is at a grade of 23 feet. Judging from this the sewer will be in the rock for but a few hundred feet.

The Laurel street sewer should be made the main outlet for the Asylum Hill district, and the outlet at Asylum avenue, west of Woodland street, discontinued.

With this carried out, the only outlets not connected with the intercepting sewer will be at Farmington avenue, and a sewer must eventually be built from that avenue along the north branch of Park river to join the main at Riverside street.

The South Prospect street sewer should be connected with a sewer on Sheldon street, to take the sewage from the buildings that now drain into Park river near Front street.

The sewage from the Taylor street outlet, east of Commerce street, is so thoroughly mixed with the waste products of the Gas Works as probably to render it harmless, but if not, by contracting the river by low masonry dams built part way across, near Front street, the current will remove the deposits now found near Commerce street.

VENTILATION.

A very important feature in this effort for sanitary reform is the ventilation of the proposed intercepting sewer, and, as it covers a question that has not often been regarded in past sewer-work in Hartford, it may be well to consider the necessity for ventilation before stating the method to be applied in this case.

The researches of chemists, the experiments of engineers, the rise of the branch of preventive medicine under the intelligent and careful investigations of physicians, and of Boards of Health have demonstrated the necessity of cleanliness in municipal as well as in personal habits, have suggested the various means to this end, and have warranted the authorities in adopting some one of them in order to prevent unnecessary sickness and death, and in compelling compliance with the laws of health of each individual in the interest of all.

Dr. R. Angus Smith ("Air and Rain," p. 386, et seq.), says, " The tendency of inquiry in modern times has been to establish a very ancient belief that decomposing substances, animal and vegetable, produce disease, and are ultimately connected with infection and contagion. . . .

" It is true that some persons object to these conclusions, and there are even many who have attempted to prove that the gases from decomposing substances are beneficial to health. The fancies or superstitions of the population have somewhat assisted this latter retrograde idea, and we find some delighting in putrid canals and rivers; others admiring the gases from brick-kilns; and others again those from accumulations of farm-yard manure. The pressure of experience, however, is so strong that these ideas will probably soon vanish.

" It has often been asked, will a sewer produce cholera, or plague, or cattle disease? We cannot say so, or that every kind of disease may be produced from such accumulations of organic matter.

"A few centuries back we perhaps had arrived at such progress in filthiness of habits that we attained the dignity of producing epidemics amongst ourselves.

This, however, is sufficiently made out—that, when these diseases do come amongst us, they take root with most effect in those places where decomposing matter is found. It would, in fact, appear as if the putrid matter itself took the disease and transferred it to the living."

Of the various methods proposed to remove the causes of disease, Hartford has chosen the water-carriage system, and the substitution of the water-closet for the privy, and the sink-drain for the cess-pool, was not simply to get rid, temporarily, of unpleasant odors, or to bury out of immediate sight in the sewer the objectionable refuse, but it was intended to be used as the readiest means of removing it all to an outlet where it would be harmless.

The closets, sinks, and sewers are all parts of a "hydraulic machine," that requires care and skill in the designing of all its parts, and through workmanship in the building of its smallest detail.

But in this, as in all machines, the practical are not equal to the theoretical results, on account of the mechanical difference in the application of the principles, of mistakes in their application, and of inferior work in the parts.

The result is that, in all the sewers, deposits are formed, and remain until decomposition ensues, and dangerous gases fill the sewers and drains,—to find their way into the confined air of houses, whenever from a change of temperature, as by the admission of hot water or steam, or from the sudden filling of the sewers by storm-water, or from the blowing of the wind into exposed outlets, or from the warmer atmosphere of the houses, these gases are forced back through the sewer-drains.

"Present experience shows that there is something in the air of sewers that is dangerous to health and pestilent to life itself; and that it is imperative by proper ventilation to dispose of or neutralize the effects of its deadly influence.

It should be laid down as a rule that all sewers must be ventilated, as unventilated sewers may be as dangerous as steam boilers without safety-valves."*

Whether we adopt Liebig's theory that "disease is due to organic matter in process of decay communicating the elements of decomposition," or Pasteur's theory of organized germs, or Richardson's theory of an organic and particular poison formed in the process of disease, the *fact* has been demonstrated by special experiment, and by the experience in fever hospitals, that contagion and in-

* Sanitary Engineering, B. Latham, p. 309.

fection are prevented by ventilation that dilutes and oxydizes the poison with pure air.

The necessity of ventilating sewers has been generally acknowledged, and many methods have been proposed to accomplish the result. The sewers have been connected with chimneys, furnaces, blowers, exhaust-fans, and steam-jets, and chemical re-agents have been poured into them. But the most successful expedient has been the construction of manholes in the sewers, with perforated covers at the level of the streets, and at intervals of from 100 to 200 feet.

In addition to the open manholes, the rain-water spouts have been connected, untrapped, directly with the sewers, and have proved of great benefit, except, of course, during rain-storms, when they are filled with water.

A special pipe for ventilation, connecting with the sewer and extending above the roof of every house, is the main feature in Colonel Waring's plan for ventilation of the "small-pipe system" introduced in Memphis, and considered by many experts as the most sanitary of the various systems now in use.

In London and Liverpool the sewers are ventilated by shafts and gratings opening directly into the streets, at intervals of 100 to 150 feet, by special pipes carried above the roofs of houses, and by untrapped rain-water spouts; in Leeds and Paris by untrapped street gullies; in Frankfort-on-the-Main, "by soil pipes carried through the roofs, by rain-water pipes, and by three high ventilating towers"; in Hamburg, by open gratings in the streets, and untrapped rain-water spouts and street gullies; in Dantzic, and in Brooklyn and Providence, by gratings in the streets.

In every city where this method of ventilating in the streets by manholes covered with perforated covers or gratings has been employed, the results have been most satisfactory, and complaints have been seldom made.

In Brooklyn,* "many of these gratings were examined, and there were only a few where any smell could be detected six feet from the surface of the streets."

This method of manholes built at proper intervals, extending to the street level, and covered with perforated covers, we recommend as the best means of securing the needful ventilation.

And these manholes will be aided in their work by the over-

* "The Sewerage of Boston."—Report of 1876.

flow openings, located near the junction of each main service sewer with the proposed intercepting sewer.

By this method of ventilation the formation of noxious gases in the sewers is almost if not entirely prevented. Such small quantities as may be formed will be so extensively diluted with atmospheric air as to be not only imperceptible to the senses, but also entirely harmless,—the organic substances being completely oxydized,—and the difference between the air in the sewer and the air outside will be almost inappreciable.

The adoption of a thorough system of ventilation for all the sewers now built is of the utmost importance, but that is aside from the present question.

EFFECT OF DIMINISHING THE VOLUME OF THE RIVER.

Another question has arisen in the consideration of the exposure of the river bed, and that is, What will be the effect of the withdrawal, by a sewer, of the water that now flows from the several sewer outlets, and forms a considerable part of the river in dry seasons?

The noxious gases from the ponded sewage aid in the dissemination of such diseases as typhoid fever and diphtheria, and the deposits of filth are thus a constant menace to the public health.

But if this source of danger be removed, the river will be narrowed, and more of its bed will be exposed by its alternate fall after rain storms and freshets. And it is questioned whether the vegetable matter deposited on the low banks will not decay there and breed malaria.

Retain the sewage, and, according to some authorities, we have typhoid fever and diphtheria; remove it, and what is commonly denominated malaria threatens.

This would seem to argue in favor of letting bad enough alone. But the argument proves too much. There is fault either in the premise or in the conclusion—or in both.

For if both be true, what folly it is to construct a sewer anywhere! The river, in its present condition, would furnish the strongest argument against the building of a sewer in any part of the city!

Individuals are compelled to remove privies and garbage-heaps from their premises, and to connect drain-pipes with unventilated sewers, for health's sake, and yet there is maintained, through the heart of the city, a mammoth privy and cess-pool.

The first duty seems to be to carry out the laws of health, and remove completely from the city limits all danger from sewage.

If another nuisance remains when one has been abated, remove that in its turn, when it appears.

We think the apprehension of danger from this source is not founded.

The only vegetation that can in any quantity be deposited and rotted upon the banks or exposed bed of the stream consists of leaves. And how nearly infinitesimal would be the quantity of these as compared with the quantity decaying throughout the city even in its thickly settled parts! And beyond that, the leaves that the river brings down are mostly carried with the stream to the Connecticut,--and *all* came down at a season of the year which is closed with the cleansing fall rains and the winter froats, which either sweep them (such as are lodged) out of the Little into the Great river, or else kill their baleful influence. And the overflow of surplus storm water, for which provision is made in the sewer proposed, will raise the stream so as to cover its entire bed during every rain, or even copious shower. Finally, should any injury to the public health arise from the cause alluded to, a sure and inexpensive remedy will be found in the construction of two or three low masonry dams across the stream, whereby its level can be maintained at the desired hight.

In considering the main question, it is well to keep in mind that nuisance considered dangerous to public health, and continually increasing in malignity, exists in Park river; and the fact that this nuisance was created and is continued by using the river (which has a small average discharge, and is obstructed by dams,) as a sewer.

There may be many ways of removing the nuisance and the unsanitary condition of the river, by plans that contemplate its continued use as an open sewer, but your committee, after considering the various plans suggested, are settled in the opinion that the cheapest as well as most effectual mode of relief is to be found in the construction of a large sewer through the valley of the Park river, which shall intercept all the sewers now emptying into the stream. The cost of one on the line suggested at about $158,000, for the whole line from Park street, in Parkville, to the Connecticut river. This is exclusive of the Laurel street extension to Farmington avenue, the change in the Asylum Hill system, and the extension through Spruce street of the Gully brook sewer. Add these, and the cost is in round figures, $188,000.

The report discusses the problems presented in all their aspects, and the conclusions reached appear conclusive. The objections against all other plans that have been suggested seem to be vital, and they appear unsatisfactory in the results likely to be attained. The intercepting sewer, if constructed, will certainly remedy all the evils caused by present pollution of the stream. If for no other reason than securing the beauty and health-giving qualities that should inhere in a public park, which is the breathing-place for pure air for the crowded denizens of the tenement houses, who oftentimes have no other recourse, the pollution of the stream should cease, and it no longer be allowed to breathe forth pestilential gases to contaminate the air of its beautiful surroundings. Indeed, in a purely æsthetical sense, as a thing of beauty, this vile, polluted stream, which, like a foul snake, crawls through the park, defacing and marring the impressions produced by the surrounding scene, should be purified, and as a pure, limpid stream, add to the beauty of that which it now defaces.

But when we consider the many to whom this park is the only chance for green fields and clear sky their narrowed and confined lives afford, and especially the sick children of the poor, to whom this should be a source of health and life, to allow this stream instead, in the time of their greatest need, to give out pestilence, sickness, and death, seems almost a crime. Fortunately these evils are in a fair way for correction. The benefits to be derived from a systematic and thorough ventilation of public sewers will also be so thoroughly demonstrated by the construction of this sewer, as recommended by Mr. Burdette, that it will be easy to extend the same method to other sewers already constructed. While it may not be possible to remove all the evils from sewers by ventilation, they can thus be reduced to a minimum, and the openings being so near to each other, but a small quantity of noxious effluvia would escape from any one, even were the sewer filled.

APPENDIX B.

RAINFALL IN INCHES FOR EACH MONTH.

MONTHS.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	Totals.	Average.
January,	1.64	3.88	5.57	2.87	1.35	3.48	5.28	2.42	26.49	3.31
February,	3.02	3.28	3.40	4.13	5.10	1.73	4.03	1.08	25.77	3.22
March,	3.01	2.44	1.25	4.85	8.79	6.93	3.28	5.78	36.33	4.54
April,	1.66	2.07	7.12	3.53	3.40	2.71	4.83	5.36	30.68	3.83
May,	2.67	6.36	4.15	1.70	4.29	0.61	2.71	1.84	24.33	3.04
June,	3.58	0.18	4.05	3.23	2.07	4.68	5.27	4.60	27.66	3.46
July,	5.48	1.65	4.92	2.51	7.44	3.17	4.82	4.05	34.04	4.25
August,	7.29	4.52	5.78	6.65	0.30	6.80	4.67	8.10	44.12	5.51
September,	3.71	2.74	2.19	2.23	4.93	1.27	2.23	2.84	22.14	2.77
October,	2.86	4.42	1.23	2.91	0.81	7.79	2.17	1.20	23.39	2.92
November,	4.45	4.05	2.70	3.26	3.56	5.41	5.00	2.10	30.53	3.82
December,	3.60	5.31	1.74	1.18	4.38	0.97	6.34	4.30	27.82	3.48
TOTALS,	42.97	40.90	44.10	39.05	46.42	45.55	50.63	43.67	353.30	

Yearly average, - - - - - - - - - 44.16

OF 600 STORMS FROM SEPT., 1871, TO OCT., 1880.

In 352	the rainfall was at rate of	.05	inches per hour.
" 140	" " " "	.05 to .10	" " "
" 54	" " " "	.10 to .20	" " "
" 22	" " " "	.20 to .30	" " "
" 7	" " " "	.30 to .40	" " "
" 7	" " " "	.40 to .50	" " "
" 2	" " " "	.50 to .60	" " "
" 3	" " " "	.60 to .70	" " "
" 6	" " " "	.70 to .80	" " "
" 4	" " " "	.80 to .100	" " "
" 1	" " " "	1.01	" " "
" 1	" " " "	1.10	" " "
" 1	" " " "	1.16	" " "

SEWERAGE OF NEW LONDON.

The discussion of the sanitary condition of New London and the laws and principles involved in securing a proper hygienic condition for the city, involves so many points that are as true of many other cities and large towns that it may be in many respects considered as the type of a class. The principal features in common are the possession of a plentiful supply of pure water supplied by a company or corporation of some sort, and the lack of any systematic drainage or sewerage, the pollution of air, soil, and well-water where used, by privy-vaults, cess-pools and neglected garbage and refuse, and the accumulated effect of these agencies having been in operation for a long time. There are also certain peculiar sanitary evils and modifications of the general effects summarized. We have, too, what is true of all such places, an undue prevalence of zymotic diseases and recurring epidemics of greater or less malignancy.

The outbreak of diphtheria here last summer, its malignancy and consequent fatality, induced a thorough survey, especially with reference to the advisability of sewers and the probability of relief from a system of sewers. There were 89 deaths from diphtheria, mainly of children under ten, for the most part from one to five. The mortality, as near as could be learned, was one in five. There were, therefore, at least 400 cases, and doubtless many more of a diphtheroid character, but few adults were attacked. The registrars' reports of England and Canada, as well as of Connecticut, show that diphtheria is for the most part a disease of the country, and if we find epidemics in the city, there must be some great sanitary defect. It is indeed a matter of record, that, where-ever epidemics, not alone of diphtheria, but of zymotic diseases generally, occur in a city, there is some neglect of sanitary requirements, the better the sanitary condition the less the number of cases and the fewer and milder the epidemics. The question then arises, what was the cause of the epidemic of 1880? The result


DRAINAGE PLAN OF THE CITY OF NEW LONDON
Surveyed and Drawn under the direction of W. H. Richards, Civil Engineer.
SCALE
264 feet - 1 inch
NOTE — Small figures show height above mean tide
Contour Lines
Covered Drains
Un-covered "
Boundry of Drainage Districts
Pipe Sewers
HARBOR
SHAW'S COVE
WINTHROP'S COVE
ICE POND
POND
N.Y. & N.H. Rail Road
N.L.N. Rail Road
BROAD ST.
FEDERAL ST.
STATE ST.
MAIN ST.
BANK ST.
HUNTINGTON ST.
HEMPSTEAD ST.
WILLIAMS ST.
CHURCH ST.
TRUMAN ST.
ASHCRAFT LANE
ASHCRAFT ROAD
CEMETERY ROAD
LEWIS LANE
VAUXHALL ST.
OLD FORT ROAD
CAPE ANN LANE
BROOK ST.

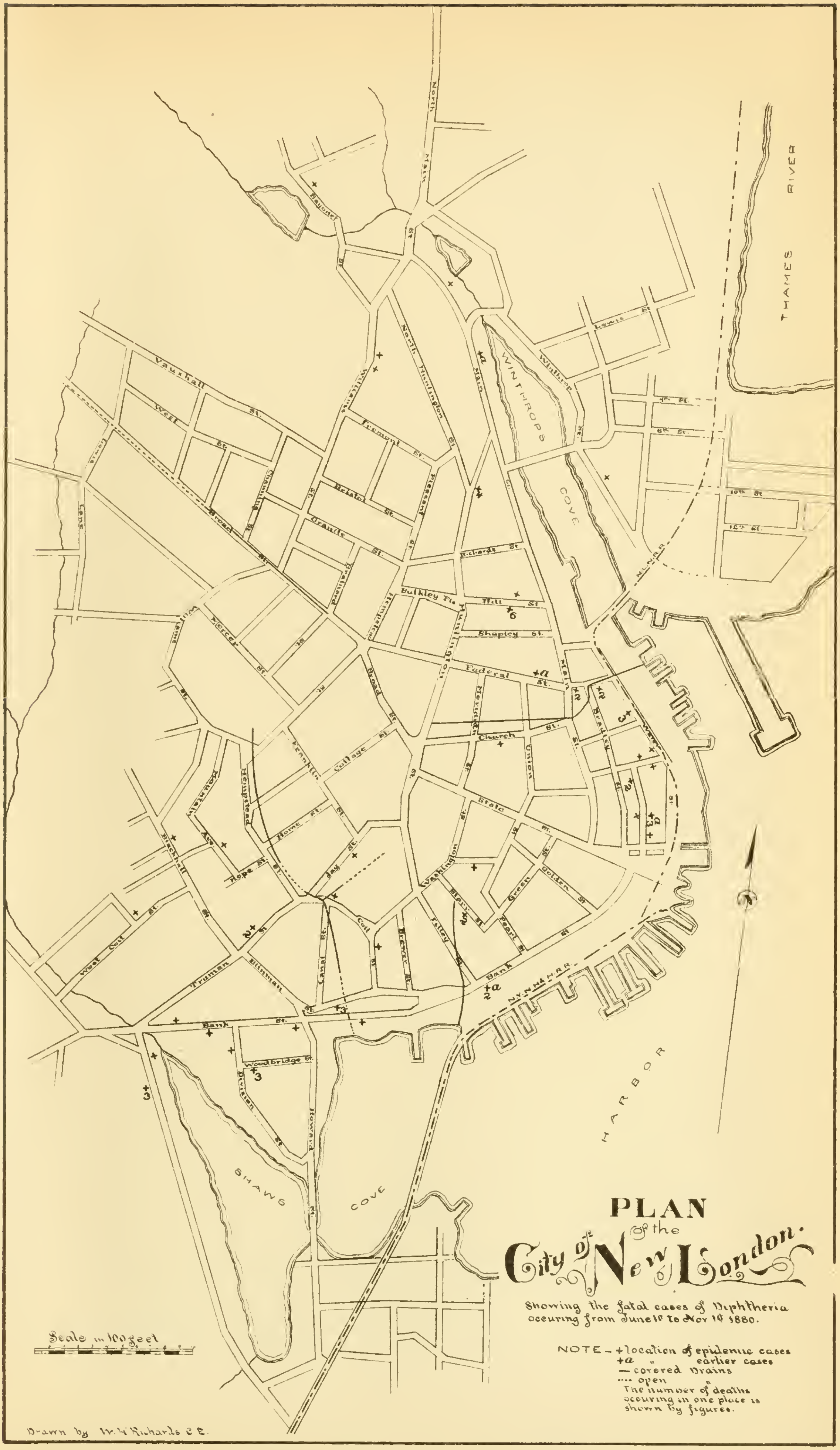
of the careful study of the causes, results in the answer of *filth*, the contamination of the air on a large scale by the emanations from putrefying excremental and vegetable refuse. The pollution of the soil by infiltrations from drains, cess-pools, and privy-vaults, and the poisoning of such well-water, as was used from previous soil pollution or direct infiltration from closely adjacent accumulated and stored filth and fœcal matters.

In New London we find therefore the sanitary evils of the country aggravated by a much larger and denser population. The preference of the disease for tenement-houses and its malignancy, heightened by local additions to the general agencies, as the cess-pool on the hill-top, for example, with eight fatal cases closely adjacent; as I remember the two houses both opened into the same yard, illustrates the increased danger from density of population. As this epidemic is so recent and its mortality so large in a city of eleven thousand inhabitants, eighty-nine deaths in a few months from one disease, attention has been very generally called to local unsanitary conditions that may have acted as causes. A very careful study of the sanitary condition of the city has therefore been made, aided by experts both within and without the city, with especial reference to prevention of future trouble. While the unsanitary conditions are fully described it must be constantly borne in mind that many of them are to be found in other cities and large towns, followed sooner or later by similar epidemics of some form of zymotic disease. The closer are such conditions investigated the more intimate is found to be their relation to the causation of disease. The element of contagion must not however be forgotten, in spreading disease, it is against their sources however we are contending. In New London in 1880 the deaths exceed the births by nearly thirty, there having been 259 births reported, and 282 deaths; 150 of these deaths were of children under ten, 99 under five years of age, about 39 % of the total mortality, an increase of 9 % over the usual average.

There is, however, one peculiar unsanitary condition of New London, that is not often found to such an extent elsewhere; I refer to the ditches covered and uncovered, that are made to do the duties of sewers and cess-pools both, they are indeed often but elongated cess-pools contaminating both air and soil. The accompanying map shows these very plainly; for distinction they are printed in red, the contour lines are also given so that any one disposed can study out the whole problem of the drainage at their

leisure. As will be readily seen, there are few cities better adapted for the separate system, the small sewer system, of Col. Waring; this was our opinion and to confirm it the services of Col. Waring were engaged, also his opinion as a sanitary engineer upon the needs of the city was asked; his report follows this discussion. The storm-water can readily be disposed of without detriment, and indeed is serviceable in cleaning the streets and gutters, so that only the sewage proper and the manufacturing waste need be provided for.

To return to these peculiar drains, they are as seen at a glance, quite extensive and for the most part, are the natural courses of small brooks straightened oftentimes, for convenience, otherwise following their old ways. The amount of water passing through them is not, however, enough to maintain an invariably unbroken stream, and deposits of organic matter are made from time to time in both covered and uncovered drains giving out emanations that can be smelled, I am told, long distances away from the source. As the bottom and sides of these are often porous soil, a constant infiltration and pollution is taking place. The luxuriant vegetation at intervals, where chance allows its growth, testify to the enrichment of the soil. Often tile drains empty into these and the sewage from water closets is added to that from sinks and manufacturing waste. The most notorious of these last summer, perhaps was that leading from the canning factory, when the season for work commenced here, large quantities of waste from the skins and seeds of the tomatoes were piled up in the rear of the establishment in its shallow cellar and ran in a constant stream along the ditch leading from it shown in the map, leading from Hempstead street across Jay, running nearly parallel with Canal to the water. Near Jay street a tile drain empties into it, commingling vegetable decay with sewage, the stench from the opening near the sidewalk was very offensive, as would be supposed. A fatal case of diphtheria marks the junction, the house standing but a few rods back and draining into the tile drain. A few rods distant was the school-house which was said to drain into this ditch. The relations of these conditions, in the cases of diphtheria adjacent, are best seen on the smaller map, where the cases are located by W. H. Richards, by whom the map was drawn. To avoid confusion the larger map shows the contours and location of the present drains. The location of the fatal cases of diphtheria is given on the smaller map.



AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

Besides the soil pollution already described, and the vile odors that contaminated the air for wide areas, these drains create a nuisance at their outlets, as they for the most part discharged in shallow water. The vile mass accumulated is exposed to the air at low, or even at half-tide, giving rise to a condition of affairs that is better imagined than described. When they discharged into the docks, the conditions were a little better, but a deposit of varying thickness was formed, which was not washed out by the tide, and added its quota to the contaminating influences. The sewage that found its way into the upper portion of the coves was an especial nuisance, as the water deserts this portion early in the day. It is more than probable that some wells were also polluted by these drains, as well as by cess-pools and privy-vaults.

Heaps of refuse, ashes, kitchen-garbage and house refuse add to the pollution of the air in all places where neglect allows them to accumulate. The use of such material to fill up low places, or to make land by filling in bays, coves, and the like cannot be too strongly deprecated; continuous fermentation goes on in such soil for years, its emanations causing disease where dwelling-houses are occupied or built upon such land. In tracing the course of these drains one peculiarity was noticed—they in several instances pass under houses, and through private grounds; often underneath the windows of sleeping apartments, creating a disgusting nuisance by their vile emanations. In one instance, a high building was on the corner of the street, next to it a shop, directly back of which and not two feet distant was a two-story building, shaded completely in front by the shop on one side, nearly as badly by the high block on the corner, with still a third building—a stable from appearance—was on the other side. To reach it one went through a narrow alley-way between the shop and the adjacent building. This house, if it deserves the name, was wedged in among tall buildings, with a small yard on one side only; no sunlight, and scarcely even air could reach the rooms on the other sides. The open ditch ran under the shop, and under the kitchen floor, (there was no cellar) allowing free entry of the disease-engendering gases that emanate from the putrefying contents of the drain to all parts of the house. A fatal case of diphtheria had destroyed the last child; typhoid fever had found its victims there previously, and acute rheumatism was inflicting its tortures upon one of its inmates at that time. This place was a regular death-trap, and there should be laws that would forbid letting it

to human beings. It was not uncommon to find the drain passing under houses which sometimes had cellars, usually not, however. The menace to health and life such elongated cess-pools present, is evident.

The cess-pools perhaps deserve mention next among the unsanitary conditions; most of these might be styled self-draining, that is, the percolation of their contents through the sandy and gravelly substrata is depended upon to dispose of their contents. They are hermetically sealed, and never opened. The pollution of the air of houses incident to this construction of cess-pools, has been fully illustrated in the article on rural hygiene, printed for general distribution, but reprinted in our second annual report. The evils of sewer-gas in the houses are thus secured, only it is your own filth, not that of your neighbors that comes back through the untrapped waste-pipe to mingle with the air breathed. Other cess-pools are cleaned more or less frequently; few, if any are cemented or have tight walls. The soil is so porous that if the cess-pool is entirely neglected, there is no danger of its becoming full. In fact, house drains end blindly in the porous soil; oftentimes satisfactorily, in so far that no trouble is encountered in disposing of the waste. A large tract of rather low land was filled in with loose stones at first, then gravel or ashes from the dumping-carts—perhaps afterwards loam, and it is sodded over as a kind of common park. I was informed that drains conveying all the house-sewage from water-closets and kitchen sinks were carried to the edge of this tract, and a sufficient outlet was afforded if the end of the drain were left open, and the whole covered up—perhaps a few flat stones just at the mouth of the drain were used to prevent the finer soil sifting down and choking the drain. What a sanitary subsoil will eventually result if this practice continues and extends. Other house drains empty in porous soil in a similar manner, or upon the surface, but conveying kitchen waste only.

The pollution of the soil, especially of the substrata, and incidentally of the water in the wells, and the air generally, results—1st, from a peculiar set of drains now open, now shut, which receive sink-drainage, excrementitious sewage from water-closets, manufacturing waste, and in certain portions, and in some parts of the year, enormous quantities of vegetable waste. The latter condition has for the present been rectified. These drains have porous sides and bottom, allowing infiltration of the surface soil when they run near the surface, and of the substrata when their

course is deep. The extent and character of this soil infiltration was shown to some extent when the brook from the canning factory was dug out and straightened, widened, and deepened in some places. The soil was almost as offensive as if it were putrefying filth instead of soil. The conditions in more porous substrata may be estimated where the course of the stream was impeded. 2d. House-drains, sink-drains, and what may be termed self draining cess-pools, and larger accumulations where occasional emptying is requisite, also blind drains, that is, drains opening into the porous soil and conveying sewage from houses; these are practically cess-pools. 3d. Numerous privy-vaults. 4th. Garbage and refuse heaps. The only condition peculiar to New London is found in the first; the drains that have been pretty fully considered. Many of the evils of sewers are produced by these drains, their influence in polluting the air perhaps has not been strongly enough stated. In summer especially, they are practically elongated cess-pools, with putrefying contents from end to end, and a bed of decomposing filth at their outlets. That they are malodorous none can deny, their influence in disseminating the seeds of diphtheria, so to speak, is plainly shown by the diphtheria map accompanying this article. Were all the cases shown, as well as the fatal ones, the course of these drains would be much more sharply accented. In conveying the germs of disease therefore, they act as badly-constructed sewers would, and also predispose to disease by the vile gases of decay they pour into the air. In dry seasons all these influences are more potent, as the less the volume of water in these drains the greater the putrefaction and air pollution. In one instance a drain runs under the floor of a large mill; this room often has to be abandoned I am told, on account of the odor from the drain. Cases of typhoid fever have justly been attributed to the close vicinity of these drains. Indeed, if a map of zymotic diseases were made, no doubt it would be more impressive than the showing from diphtheria. These cases are, however, recent and impressive from their number, but the unnoticed influence of such unsanitary agencies is many times worse than the most malignant epidemic. In dry seasons also the seepage into wells from privy-vaults and cess-pools is worse, because less diluted—that is, in a given volume of water the proportion of adulterants will be greater. The exhalations into the air are of course greater, and they remain longer; every rain washing the air dissolving all these noxious gases of decay, con-

veying them to the leaves and rootlets of plants where they act beneficially, and washing down too the floating particles of excrement that the heat and wind had set floating. No wonder that the air is so refreshing after a rain in summer.

Owing to the topography of the city, dividing certain portions into flats, as it were, the inhabitants on the lower levels are very liable to receive unsanitary influences from their higher neighbors. This is particularly true of soil and water-contamination, indeed of air also, for that matter. Fortunately, the city is abundantly supplied with pure water, otherwise the effects of the conditions described would be much more impressive. The well-water is however occasionally used, hence reference is made to its pollution. The liabilities of those on lower levels to contamination are more marked when tenement houses with their accompanying vaults and cess-pools are crowded into small lots which back up against each other. The underlying rock formation guides the contaminated water, as of course but little soaks into the ledges. The outbreak of diarrhœal disease last summer, forty cases or more of people working in one locality, all or nearly all using water from a certain well, is a case in point. Analysis some time after it is true revealed nothing, but the water in a well constantly used changes rapidly; even from the same well at different levels it is found to be of entirely different character. Analysis of two specimens thus, one from the top of the water in the well, the other taken from near the bottom, have given entirely opposite results. Surface drainage had run in, contaminating the upper layers, while that below was perfectly pure; one specimen was therefore condemned as unfit to drink, the other eulogized for its purity.* At first discredit was thrown upon our examiner; it happened the specimens were sent to different parties, until the case was investigated. It is not always that chemical analysis reveals the causes of disease in water, even the microscope oftentimes fails, so that the *onus* of causation must rest upon the drinking-water for the present.

This rock formation, cut into plateaus as it were, aids the pollution of soil and water by restricting the amount of soil to act as a deodorizer, and allowing the foul water to be spread over greater areas than if it sank deeper. It must be remembered, in discussing soil-contamination, that liquids from the surface sink into the ground if of sufficient volume, and especially in a porous soil until the level of the ground water is reached, and then spread in all directions, sink-

* Wanklyn.

ing no further except by the diffusion of liquids. This rocky foundation has the same effect as an elevation of the ground water-level, bringing it nearer the surface, thus rendering soil-contamination easy. It will readily be seen also how much more likely the wells are to be polluted by this spread of the liquid filth in the soils. In addition to the sources of soil-contamination already mentioned the dangers from contamination of the wells from surface-washings must be added; this is greatest of course where a well receives the surface-water from higher occupied levels. Fortunately the use of well-water is never a matter of necessity, although it was said, as a matter of choice in the scarcity and high price of ice, that well

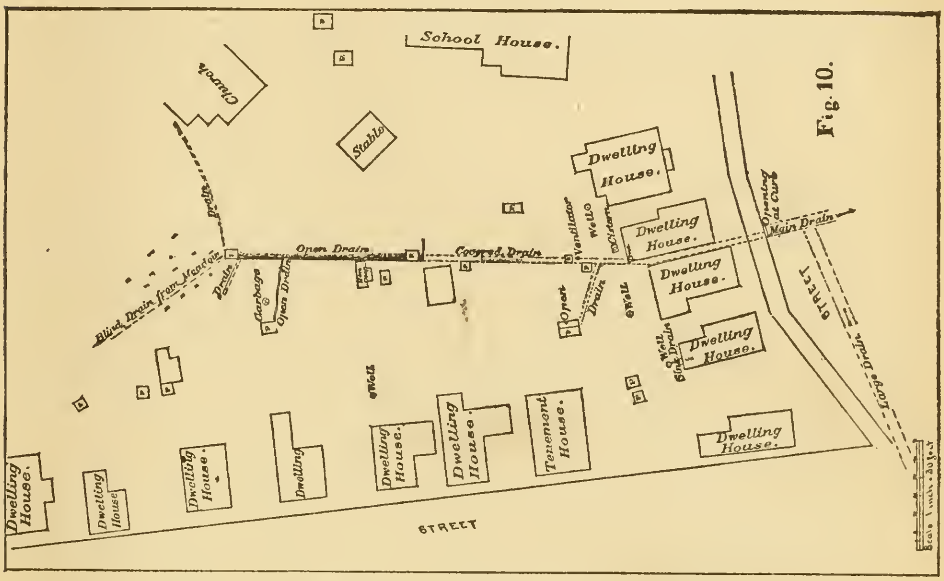


Fig. 10.

water was used during the past summer because it was cooler than that from the hydrants. There was also at one time a bad taste in the city water that may have induced the use of well water to some extent. The well-water was used more or less then during the summer, and doubtless added its influence to the others.

Sometimes the privies are but a few feet from the house, or attached to it; a few instances they are in cellars, a nuisance to health in every respect, discharging their poisonous effluvia directly up through the house, both sitting and sleeping-rooms. Owing to the differences of level, we occasionally find the vault but a few feet from the window of a sleeping-room of a house below. The illustration shows how thickly these vaults are sometimes crowded in a small area, especially when back lots join, forming a sort of

cul de sac. The cess-pools and openings of drains are not indicated; the drain shown empties into that from the canning factory after receiving tile drains from several houses. These vaults by slow percolation saturate the surrounding subsoil so that it no longer acts as a deodorizer or purifier, and the area of this saturated soil around vaults and cess-pools slowly increases from year to year. These conditions are not peculiar to New London; in every epidemic of diphtheria or typhoid fever that I have investigated, I have found pollutions of the soil. The conditions found in Norwich last year and in Meriden are in point. Indeed it is a matter of record that wherever there is a malignant epidemic of zymotic disease, some decided sanitary defect is invariably found, which fully explains the conditions that result.

The following illustration shows the relation often discovered

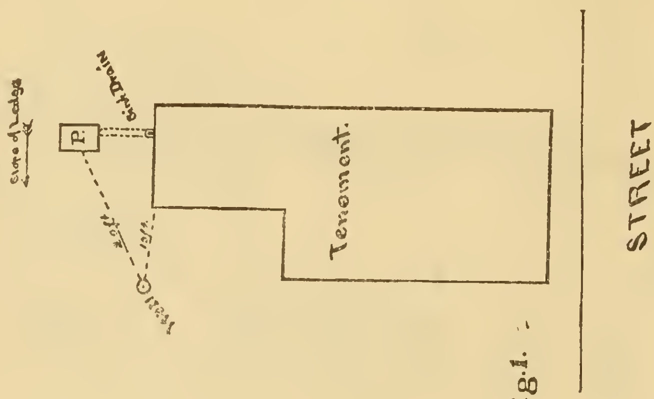


Fig. 1.

between the sink-drain, privy-vault, and well, although even closer proximity was not indiscoverable; sometimes a cess-pool should be substituted for the sink-drain, it then becomes a type of a large class. There is no greater menace to health than the stored fecal matter of privy-vaults, next to this are to be ranked cess-pools. In the former are preserved indefinitely the germs of disease, that may at any time find their way into circulation. The sub-irrigation system is infinitely preferable to the cess-pool, and practicable wherever there is a small lawn. For a city of this size, sewers are a matter of almost vital necessity; they cannot afford to furnish the conditions for a malignant fever to decimate them, and the obvious way of prevention is to remove the filth at once, instead of storing it up to breed disease.

In the case of seven deaths on the hill-top, a foul cess-pool con

nected with one of the tenement-houses where three of the children died and within a few rods of where four others died along the outlet was a *cul de sac* caused by a projecting point of rock where filthy water was retained in which children sometimes dabbled and played. In exploring the region apparently healthy and well-drained indeed, on the top of a high hill I noticed this small pool of filthy water and called attention to it; on investigation it was found that when full the cess-pool overflowed, leaving foul water here, also when emptied a deposit was left here, in addition to the foulness of the cess-pool itself. The following remarks by Dr. Lindsley upon cases in New Haven are in point here in the discussion of causes.

In the mortality statistics for the month of November in New Haven the most marked feature was the fact of sixteen fatal cases of diphtheria and membranous croup. As compared with any previous month for more than two years this indicates a large increase in the prevalence of this disease. The victims were all children, a large majority being under five years of age. The sixteen fatal cases occurred in as many different houses. They were scattered as widely as possible in every direction, but occurred almost wholly in portions of the city remote from the center. Sanitarians are already agreed that among the causes of diphtheria, filth is the most prominent factor. It is generally called a filth disease. By this is not meant simply dirty faces and hands and soiled clothing, but that the victims of this disease have been living surrounded by such accumulations of filth that the air of their houses has been poisoned by the emanations from it, or their drinking water.

In this view, it is of interest and deep concern to inquire what agency such conditions have had in the present outbreak in our city. Every house in which a death has occurred has been visited and carefully observed by the sanitary inspectors of the board of health. Their reports are all in close accord with the theory that this disease—except in cases of direct contagion—is always associated with foul air or water from filthy surroundings. The infected houses were, for the most part, on streets in which there are as yet no sewers. Only three of the houses were connected with the public sewers. In one of these the only defect detected was imperfect ventilation of the water-closet in the house and of the drains. In this case, however, a vacant lot in the near vicinity had been used all the season, as a place of deposit for all sorts of

refuse, and at times the stench from it was offensive. In the other two houses with sewer connections there were no intervening traps to obstruct the passage of sewer-gas directly to the interior of the house. In one of these were four kitchen sinks—none trapped. Of the remaining thirteen houses, nine stored up their kitchen slops in cess-pools, which were wholly unventilated, but connected by drain-pipes directly with their interior apartments, thus effectually securing the passage of all cess-pool vapors through them. Some few of these were enjoying a fancied security, because their sinks were trapped with a bit of bent tubing, but one might as well trap the neck of a bottle and expect to fill it with wine and not drive out the air that was in it. If cess-pools are tightly covered over, it is quite evident that the gases made in them will escape through the pipes and drains leading into them, and no trap can stop it. At the remaining four of the sixteen houses, the kitchen slops and other refuse were merely thrown out the door upon the surface of the ground. The privies were generally overfull and offensive; sometimes located, as well as the cess-pools, in dangerous proximity to the wells.

The above general descriptions were in some of the houses diversified by additional facts, such as the keeping of hens in the house, cess-pool overflowed into the cellar, cellar dark and wet and wholly unventilated except by trap-door in basement floor, yard small, low, wet and sloppy.

In no house where death had occurred from these diseases did there fail to be abundant cause for a foul and poisoned atmosphere.

It is the belief of the best sanitarians that diphtheria cannot possibly become epidemic in a community where the atmosphere is pure and a good state of public hygiene is maintained.

Dr. Snow, the venerable health officer of Providence, says in his report last month : "With regard to the causes of diphtheria and typhoid fever in cities, they are well understood; indeed it may be said that they are positively known at the present time. They are impure air or impure water, the impure air generally arising from collections of sink-water or from privy-vaults. These are causes that can be prevented or avoided in nearly all cases; they are causes that in cities, almost without exception, exist in the houses, or in the immediate proximity of the houses where the diseases are found. If these causes are allowed to remain in or about any house, cases of diphtheria or typhoid fever in their season may be expected to appear in the same house. The converse

is also true, that if cases of diphtheria or typhoid fever do exist in any house, it is proof positive that the causes of the disease also exist in the same house."

It is doubtless due to the generally good sanitary condition of New Haven that the disease is not epidemic. It exists on every side of the city, and will spread wherever it can find the necessary conditions for its propagation.

It is believed by those who have the best means of knowing that our city is thirty to fifty per cent. cleaner than it was before our sanitary inspectors began their systematic work of looking after unsanitary places. There can be little doubt they have saved many a household from an untimely bereavement. Ought not their number to be increased?"

It will be remarked that while there were fatal cases, these did not act as foci or centers of disease. Indeed, malignant cases were reported in many places where all the children in one family died, but the pollution of air, soil, and water that has been illustrated in New London did not exist. Hence no epidemic. However well ventilated buildings may be, if the outside air is tainted with the emanations from privy vaults, or loaded with excremental particles, and cess-pool effluvia, all appliances are futile for preserving health.

In marked contrast to these conditions was the localized epidemic in Meriden. Here we have similar conditions to those in New London. In the region where the diphtheria originated there is a narrow stream running behind a row of tenement-houses. On this stream is a row of privies, and these are used by a crowded tenement population. The stream is but three feet wide at its widest, and often choked up almost entirely by the deposits which the sluggish currents were unable to remove. In a limited area the conditions that are prevalent in the tenement population of New London were repeated here with the same results. This condition of things, I am happy to state, no longer exists there. The radical improvement of the whole neighborhood had already been determined before this outbreak, and the occurrence of the disease only emphasized the lesson already partially learned, that the removal of filth prevents disease. The last family I attended with diphtheria illustrate the same point on a small scale. There were five successive cases in the children, and diphtheroid sore-throat in case of the mother. An unventilated water-closet was in a cupboard in the middle of the bedroom, foul-smelling at all times from constant use by so large a family of little ones, and not protected

from the sewer. Carrying the soil-pipe to the roof would partly remove the evils. The location itself is, however, faulty. The map illustrates forcibly the relation of these drains to the disease. Each drain almost is a center for malignancy, and notably near the outlet. As plainly as if the finger of Fate had pointed its course, we see the center near the foot of Canal street; again around the outlet-drain between Brewer and Tilley streets; and most marked of all around the outlet of the Church street drain. This association is not accidental. A similar local condition accounts for the seven fatal cases on the hill-top, while local conditions and contagion readily account for the scattering cases. This grouping of the malignancy is marked, and appears more plainly when put upon the map than it did in tracing the fatal cases from house to house, as I visited personally all these infected quarters.

There is little if any room for doubt that a thorough sewerage of the city would remove these evils. The outlets of the sewers should be carried, however, beyond the line of the docks, so that there should be no deposits there. The cost of the small-pipe system is comparatively so much less that this need no longer be a formidable objection. The experience of Memphis has demonstrated the practicability of the scheme, and its superiority over the plan of mixing the sewage and storm-water. This plan is fully described in our second report. As it provides for complete ventilation of the sewers, all the objections urged against poisoning by sewer-gas are obviated and thoroughly set aside. Even with all the confessed evils of the other system the city would be repaid for the expense of sewering the city by any plan, as the present evils are likely to go on increasing from year to year. Briefly stated, the separate or small-pipe system starts with a six-inch drain-tile, and gradually increases in size, as the volume of the sewage increases, until in the mains eighteen to twenty-inch pipes are used. The laterals are flushed automatically by flush-tanks gauged to empty at requisite intervals, and at every house the soil-pipes are carried up through the roof for ventilation. The only essential condition is plenty of water for flushing, and that New London has.

Col. Waring's report will be found to discuss several of the points here mentioned. It, with the recommendation for a complete sewerage of the city, is respectfully submitted to the citizens of New London for their earnest and thoughtful consideration. Sooner or later the city must be sewered, and it would

seem that the present evils were severe enough to demand prompt action. The greatest objection, inordinate expense, is removed by the adoption of the new system, which has apparently demonstrated its superiority over all other methods.

The dangers from these unsanitary conditions are not liable to decrease. Indeed, the opposite will be the result. From its situation, New London ought to be one of the healthiest cities in the State, and there is no reason why epidemics should ever occur if these deficiencies are radically dealt with. The city has secured one sanitary essential—an abundant supply of pure water. Unless, however, a drainage system be added, a condition inviting malaria will be likely to ensue, as everything that tends to raise the level of the ground-water, bringing it nearer the surface, may be said to favor the existence of malarial diseases. There is no apparent connection between the existence and spread of malaria in this State, with pollution of water or soil. The typhoid element may be thus superadded, and, by the way, typhoid fever is a disease almost unknown in a well-sewered and drained town, and would soon almost disappear from New London after the sewers were introduced. Malarial diseases, so far as any law can be deduced, invade new territory where natural drainage is markedly interfered with, as by the raising of dams, the ponding of water, extensive embankments, as for a railroad,—in a word, the retention of water in the soil, and delaying its onward march towards the sea. Great confusion often arises from confounding the causes of such diseases as typhoid fever, diphtheria, and the like, and the intermittent fevers or malarial diseases. The latter are not, strictly speaking, filth diseases, unless one attributes them entirely to vegetable decay, which is untenable, as we find them on the high mountain plateaus, where decay of any kind is almost unknown. The ground-water theory, however, is universal almost, or more nearly so than any other offered. It is, in brief, that malaria is favored if not caused by alterations in the level of the ground-water; and, other things being equal, the nearer the level of the ground-water to the surface, the more favorable the conditions for the production or existence of malaria. Abrupt and irregular alterations of level and obstructed flow are nearly equally favorable conditions. The existence along river courses of the disease, its appearance soon after the causes mentioned are set in operation, as the first cases originating in Hartford in 1871, following the construction of the dyke for the Valley railroad, and in its close

proximity. Were the question under discussion, instances might be multiplied. This reference to causation is to prevent confused thinking and reasoning on the sewer problem. The following report of Col. Waring presents the opinion of an expert.

THE SEWERAGE OF NEW LONDON.

DR. C. W. CHAMBERLAIN,

Secretary State Board of Health, Connecticut:

DEAR SIR: In conformity with your instructions I have visited New London and gone carefully over the whole of the city, with which I was already quite familiar.

As I understand that you are receiving from other sources an accurate account of the very unsatisfactory sanitary condition of that city, it is not necessary for me to say more than that it seems to me eminently necessary that some radical improvement in the manner of disposing of its domestic and manufacturing waste be undertaken at once.

It has one feature so peculiar that I cannot avoid calling attention to it again; that is, in the effort to drain some of the lower land, and to carry away surface-water accumulating at the foot of slopes, a number of stone drains have been constructed, some covered and some open. As the convenience of the community has required it, many private house-drains and some drains which are almost worthy to be called sewers, have been delivered into these very unsatisfactory channels, which, from their slight inclination, and the roughness of their floors and sides, have accumulated solid filth to an alarming degree. The matter so deposited undergoes, especially in warm weather, an active decomposition, and the stench arising therefrom finds its escape, in the case of the covered drains, only at the untrapped gully-holes, where gutter-water is taken in. Undoubtedly this use of these drains has also led to a very considerable pollution of the soil. In addition to this, and as a much more general and important source of soil-pollution, privy-vaults and cess-pools are in use throughout the city, and the mis-named "odorless" excavator is employed for the removal of such of their contents as do not escape into the ground.

You ask me to report, whether or not the city may be easily sewered, and whether or not it is susceptible of the application of the small-pipe system.

It seems to be the universal opinion of the officials and citizens whom I consulted that it would be entirely safe and satisfactory

to deliver the sewage into the deep water of the channel at the end of the pier next south of the railroad ferry. If so, a very serious element of the work would be satisfactorily provided for. I have, myself, some doubt as to the permanent adequacy of this outlet; but by delivering the sewage at this point the immediate difficulty would be overcome, and, in the event of other means of disposal being found necessary in the future, little if any of the work would have to be modified for that purpose. It seems prudent to recommend such an outlet for the present, bearing in mind that it may sooner or later become necessary either to extend the outlet some distance into the river or to deliver the effluent by mechanical power to a more distant point of disposal.

So far as my preliminary examination has enabled me to decide the question, I am disposed to think that the most satisfactory plan would be to build two intercepting sewers, one from the western end of Bank street—say from about its junction with Truman street, following the street to about the foot of Brewer street, and then running along the flat land near the shore between the foot of the hill and the New Haven railroad as far as the point of outlet; the other intercepting sewer from the junction of Main street and William street, following the line of Main street to about Mill street, and thence running near the shore all the way to the point of outlet. The location of both of these intercepting sewers will require much study; but there is certainly no insuperable difficulty in the way of their proper and economical construction. It would be necessary to build them with extremely slight fall, and to depend on copious flushing to keep them clean. Fortunately the brook running from the old ice-pond to Shaw's Cove will furnish an ample supply of water for a flush-tank at the head of the Bank street sewer, and the ice pond near Bayonne street will in like manner be serviceable for the flushing of the Main street sewer.

The flushing water ought in both cases to be held back in flush-tanks, to be delivered suddenly at intervals. Such a stream as would be delivered by a 1-inch pipe would in each case be amply effective.

The only remaining difficulty in the case is in the very considerable amount of rock that would be encountered near the surface. This obstacle has been overcome in the construction of the water-works, and it can be, in like manner, overcome in the construction of sewers. It will necessarily add considerably to the cost of the work.

To offset the difficulties above referred to, we have the important fact that the grades in nearly the whole city are quite steep, and that the consequent velocity of the flow of the sewers will make it possible to adhere to small-sized pipes over nearly the whole area. Also that in those localities where rock would be encountered the slope is generally so steep that satisfactory drainage would be given to the houses by very shallow sewers at these points.

On the whole, offsetting the disadvantages with the advantages, there certainly is no reason to suppose that the work would be especially difficult, nor that especially costly.

In answer to your second question, I would say, most decidedly, that the city is perfectly adapted to the application of the small-pipe system; and that all of the advantages claimed for that system under any circumstances will have their full effect here. The water-pipes are carried throughout the city, so that there would be no difficulty in obtaining a supply for flushing at the head of every sewer. The steep grades would aid very much in the ventilation of the sewers, and,—which is very important—the delivery of all the sewage would be, owing to the steep grades, so immediate that there would be even less reason than usual to apprehend decomposition within the sewers; furthermore, the sewage would be delivered in such a fresh condition at the outlet that it is quite possible that there would be no perceptible fouling of the river, even after the whole area shall have become densely built over. In fact, it is more than probable that the sweep of the tide, at the point where I have suggested the placing of the outlet, would be sufficient to cause the complete dispersion of all organic matter delivered into it.

There are several sewers now existing in the city which it may be well to retain. The only question about it, relates to the manner in which these works were constructed. The sewer in Federal street, with its extension and its branches, is eight inches in diameter, which is sufficiently satisfactory; but if its joints are not so tight as to prevent the escape of sewage into the ground, its most important office,—the complete removal of foul matters, and the prevention of pollution of the soil,—is not performed. I would suggest that this sewer be very carefully inspected, and that if found faulty in this regard, that it should be thoroughly repaired.

This sewer now delivers at the bulkhead line in Winthrop's

Cove, which is a most undesirable point of outlet. Too much pains cannot be taken to prevent the admission of foul drainage into this cove, as much of its bottom is exposed at low water, and as it is practically unflushed by the tide, or by the stream running into it. The Federal street sewer should deliver into the intercepting sewer above suggested.

The State street sewer may or may not be in satisfactory condition; and this can be determined only by inspection. As it is twelve inches or more in diameter, and as it serves only a very small drainage area, I should much prefer to see it removed and replaced with vitrified pipe of the proper size. It now delivers at the bulkhead line near the Groton Ferry. Its effluent is offensive, and the matters which it deposits accumulate in front of it. This sewer, or any sewer substituted for it, should deliver into the proper intercepting sewer.

It would be quite premature to attempt to form anything like a close estimate of the cost of carrying out a complete system of sewerage, with the use of small pipes, flush-tanks, etc. But as it is desirable to give some idea on the subject, I have roughly calculated that the complete sewerage of the thirteen to fourteen miles of streets within the city, as shown by Mr. W. H. Richards' drainage-map, would not exceed $100,000, including the cost of the intercepting sewers and their appurtenances, and the cost of carrying an outlet pipe fifty feet beyond the head of the pier.

In addition to the sewerage of the city, it seems to me important that a radical improvement should be made in the manner of surface and subsoil-drainage in those few localities where special provision is necessary. Ordinarily, the flow over the surface of the streets is very good, and it will be a simple matter so to arrange the discharge of the gutters as to cause no inconvenience, if indeed any inconvenience is now caused thereby.

But at several points the whole surface is low and its natural drainage is inadequate. This is especially the case in the southern part of the city near Howe's Cove, where the rough-stone drain (sometimes open and sometimes covered,) serves for the outflow for a considerable area. In this case, as in all others, where there is a tendency to undue wetness of the soil, there should be a good and reliable covered conduit or under-drain, not communicating with the surface, but serving simply to remove soil-water and to receive the percolation of the rainfall. This drain should be guarded against the admission of foul matters of any sort, and

should do no work but the mere draining of the subsoil. Doubtless much of the surface-water which now finds its way into these stone drains may be diverted and made to flow through to street gutters. So far as it cannot do so it should be led away, not in a deep cut, but through a grassed or paved depression of the surface, barely sufficient for its discharge; and ordinarily, except during and immediately after rains, quite dry. It is impossible for me now to prescribe at all in detail the manner in which this work should be done, but it would be a very simple and inexpensive matter. The present condition is certainly most objectionable. This sort of drainage in New London, wherever it has been carried out, is evidently an inheritance from the former village condition of the city. It is a sort of work which does much mischief in villages, and whose mischievous tendency increases as population becomes more dense. As an element of the engineering work of a city it is simply disgraceful.

To sum up, I would say that while the sanitary condition of New London is now evidently very bad, it will be an easy and by no means a burdensome matter to make it absolutely good. The especial ends to be attained are:

First, the immediate and absolute removal beyond the limits of the city of all manner of domestic and manufacturing wastes. This can be perfectly accomplished by a system of small sewers constructed substantially after the plan of those recently introduced in the city of Memphis.

Second, the adequate drainage of the soil in those few districts where this is needed. This can be accomplished by the use of independent under-drains, and by such surface works as would lead to the rapid removal of the rain-fall.

It hardly comes within the scope of the question as presented to me, but I venture to suggest that the city government might with advantage be empowered to pass ordinances similar to those adopted in Memphis, making connection with the sewers compulsory; regulating the manner in which such connections shall be made; compelling the cleansing and filling up of all privy-vaults and cess-pools, and prohibiting the disposal of any manner of refuse on the ground or under the ground, or anywhere else, except into works connected with the sewers, or into the proper receptacles for garbage.

From the excellent character of its soil, and its unsurpassed situation, it seems to me that New London need look to nothing more than is herein suggested, to secure the most absolutely healthful conditions possible to a New England community.

Very respectfully,

GEO. E. WARING, Jr.

New York, Nov. 6, 1880.

THE

HYGIENIC CONSTRUCTION

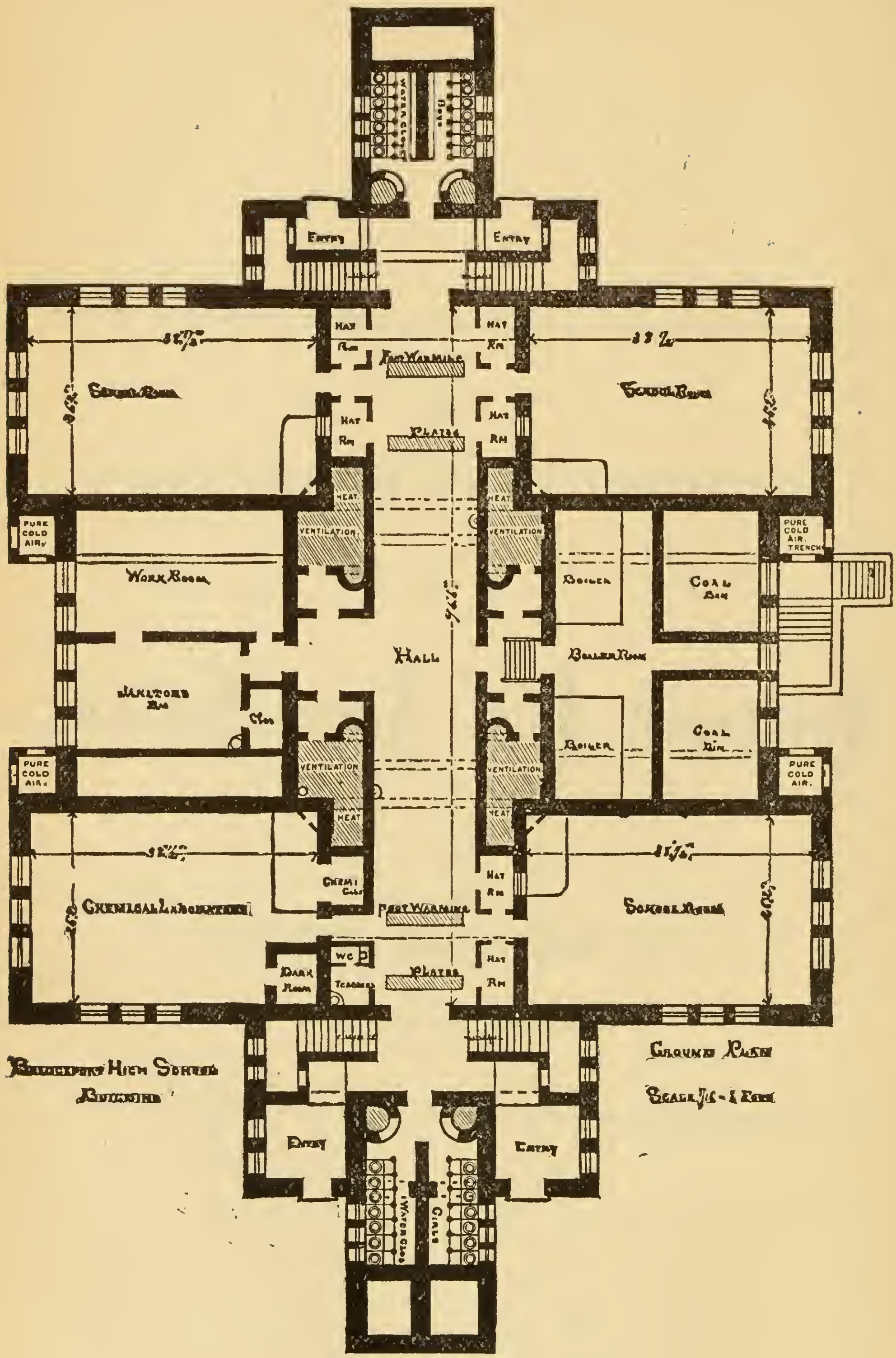
OF THE

Bridgeport High School Building.

BY

W. RICHARDS BRIGGS,

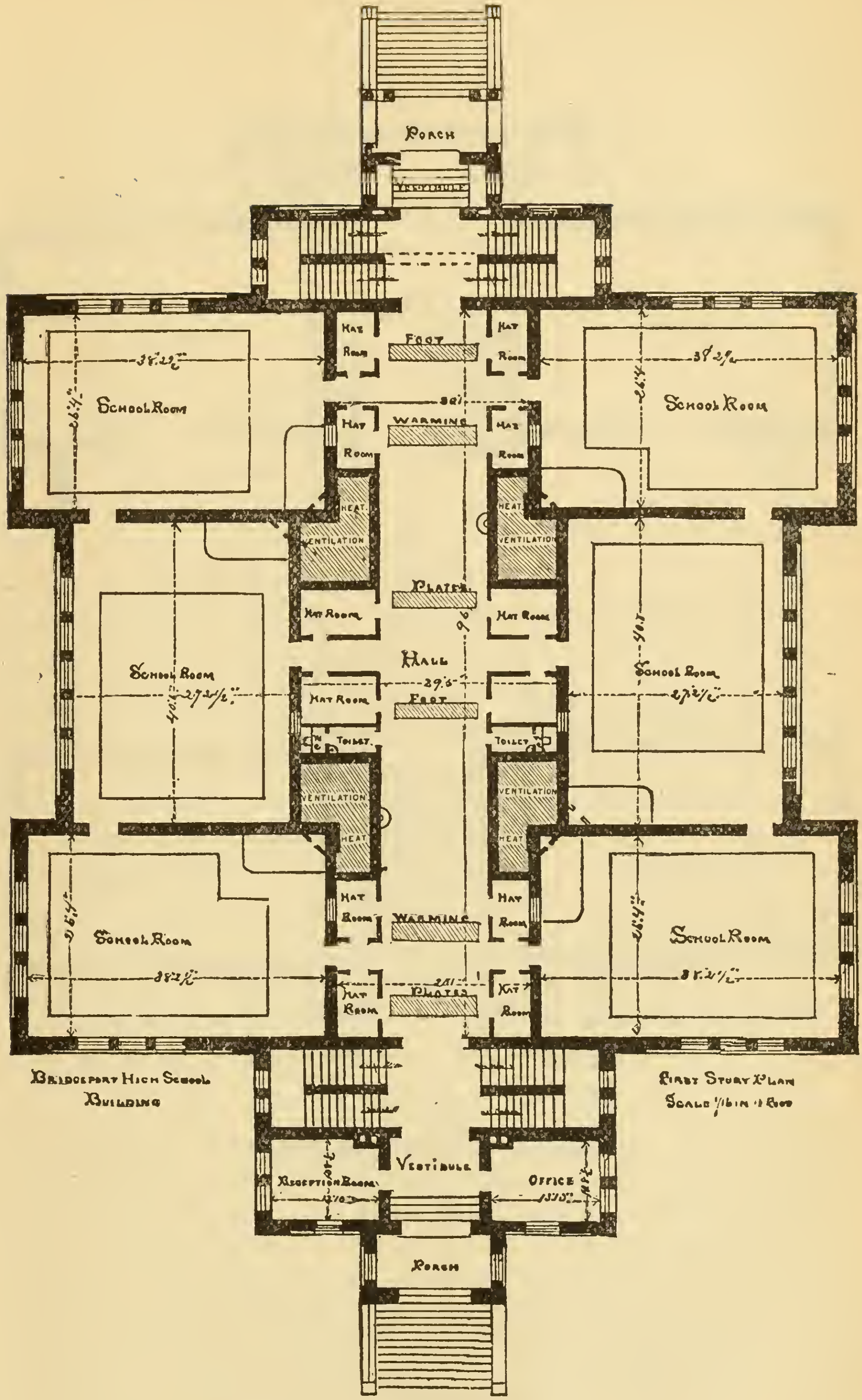
ARCHITECT, BRIGEPORT, CONN.



Bridgeport High School Building

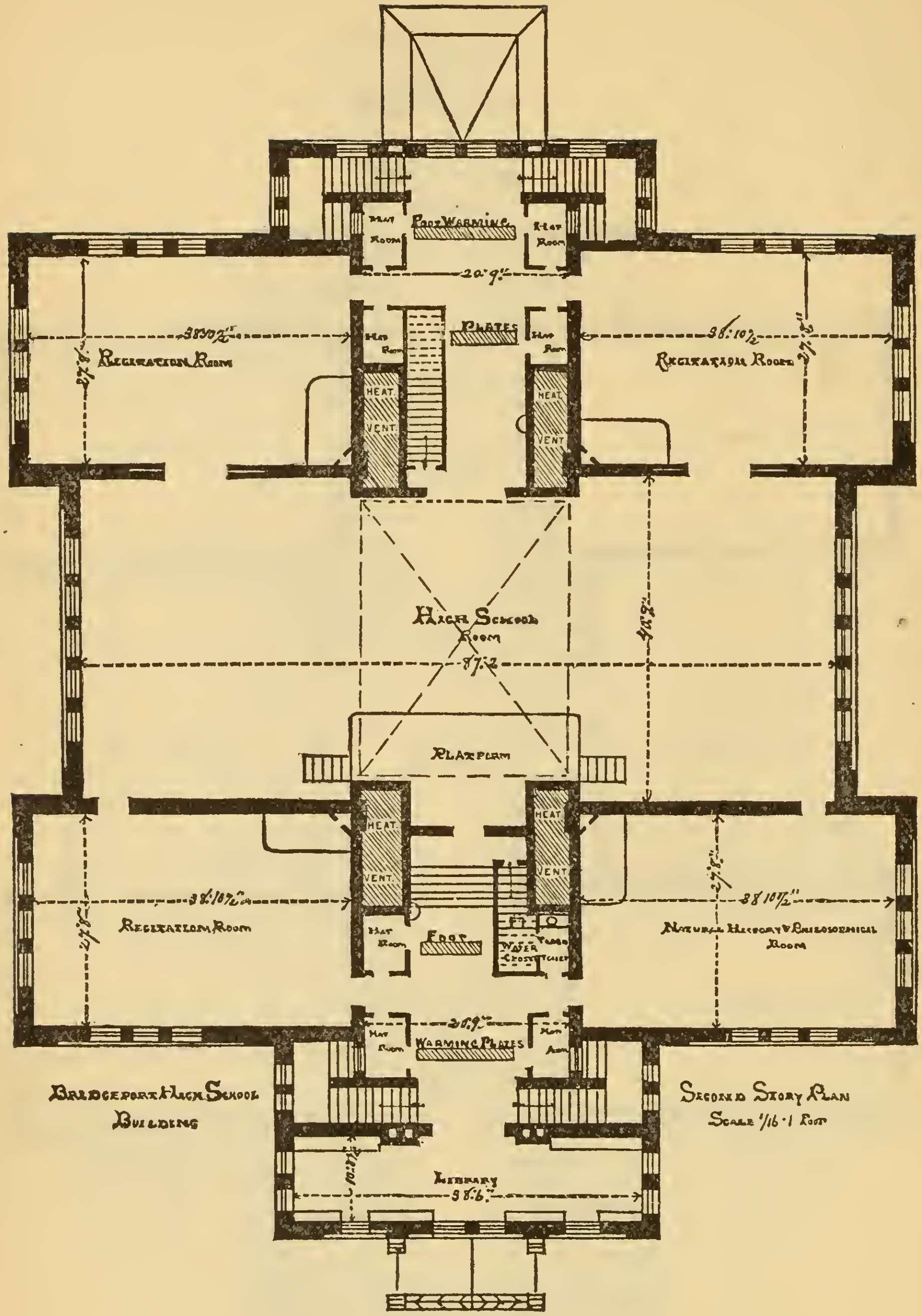
Ground Plan

Scale 1/16 - 1 Foot



Bridgeport High School Building

First Story Plan
Scale 1/16 in. 1 Foot



Bridgeport High School Building

Second Story Plan
Scale 1/16 · 1 Foot

THE HYGIENIC CONSTRUCTION

OF THE BRIDGEPORT HIGH SCHOOL BUILDING,

BY WARREN R. BRIGGS, ARCHITECT, BRIDGEPORT, CONN.

In no department of public or private works is there such vital necessity for a perfect system of hygiene as in the planning, construction, drainage, and ventilation of our school buildings. At no time in our lives are we so susceptible to disease as in our school-days. The rapid growth of the child, the mental strain that our forcing system of education requires, and the bad sanitary condition of many homes, all tend to weaken the constitution at this period, and render it particularly liable to the contraction of disease. The necessity of abating, as far as possible, and ultimately exterminating, what is known as preventable disease, has become of paramount importance. The alarming spread of malarial diseases and malignant epidemics among children in various parts of the country I attribute, in the majority of cases, to criminal carelessness in sanitary matters. Miserable construction, poor sewerage, bad plumbing, and no system of ventilation, combine to produce among the poor classes hot-beds for the nursing of the germs of pestilential disease, which are then conveyed by the children to our school-houses. Much has been accomplished by our State and local boards of health to remedy this evil, but there still remains a vast amount of work to be done. Stringent legislation is needed in all matters pertaining to building, and proper officers appointed by the Governor to see that the laws are enforced are required in all larger cities in the State; when this is done we may hope to see the erection of the miserable shams, that greedy speculators and unscrupulous landlords now burden us with, stopped. So long as they enjoy the license which the present laws allow them, we can hope for no improvement.

The school-house, where the child spends from four to six hours

each day, demands our direct attention. The majority of the pupils in our public schools come from the poorer classes, and are, as a rule, none too cleanly in their personal habits; coming from homes which have none of the luxuries and barely the necessities of life, they are in no condition to be subjected to either excessive heat or extreme cold. Foul air and poor ventilation they have in plenty at their homes, and we should endeavor in the school-room to supply them with pure air, uniform temperature, plenty of sunlight, cheerfulness, refinement, and comfort; our buildings should be so planned as to combine all of these requirements.

Dr. Lincoln, in his admirable paper recently published in *Buck's Hygiene*, has plainly told us what a school-building should be, and the writer has endeavored, as far as lay in his power, to produce a building that shall be a model of its kind. He has not only labored long and faithfully himself, but has consulted the leading experts of the country in regard to the heating, ventilation, and general sanitary arrangements of the building, and has always received from them their hearty approval, coupled with the remark: "We have frequently called the attention of the public, in our articles, to what a building should be, and we are glad to see at last a building planned in accordance with our views."

In all the writer's efforts he has been most ably seconded by the Board of Education of this city, and more especially by the members of the board who comprise the building committee. They are, to a man, whole-souled, enlightened, Christian gentlemen, who have the welfare of the public in view, and although they have been severely criticised and wrongfully assailed, they have unflinchingly put their shoulders to the wheel, and worked with a zeal that cannot be too highly commended to secure for the city a building that can be pointed to with pride, when finished.

The site of the new building is admirable: situated almost in the geographical center of the city, in one of its best localities, far removed from all noise, dust, or odors arising from factories, stables, or the like, being completely isolated on all sides, having no large buildings or trees to shadow it, and standing within a few feet of the highest ground within the city limits, it presents natural advantages that have never been surpassed, and seldom equalled. The lot has an actual elevation of 61.0″ above the average high-water in the harbor. It has a frontage on two streets of 200′, and an average depth of 256 feet, the lot running from street to street. Not only are great advantages obtained by this frontage, in ease

of access to the building, but thus are secured unexceptional facilities for the disposal of sewerage, there being a twelve-inch main running down the hill in the center of both streets; the fall of these streets is very rapid, being between four and six feet in every hundred.

The principal front (there is no rear) of the building faces Congress street, which, running nearly east and west, gives it a southwesterly exposure. This arrangement secures in every room in the building, during a portion of the day, *sunlight* in abundant quantities.

The building is designed to be constructed of brick, with local stone foundations and underpinnings, brown-stone caps, sills, and trimmings, exterior steps to be of granite, and roofs of slate. It will consist of three stories, viz., the ground-floor, first story, and second story. It contains a total of fourteen school and recitation-rooms, a chemical laboratory, reception-room, office, library, janitor's room, work and boiler-room, beside the water-closets.

The height of all rooms in the building, with the exception of the High School room, is 13.0″, the High School room having a height of 28.0″ in the center, and 21.0″ on the sides.

The writer does not consider it necessary to go into a detailed explanation of each floor-plan, but will simply call attention to some of the novel features and general construction of the building. The plans themselves illustrate sufficiently the general position and arrangement of rooms and halls.

The ground-floor is located two steps, or about fifteen inches, below the grade of the lot. This, under ordinary circumstances, would be considered an objection, on the plea of dampness, but the floor and side walls have been so carefully prepared that the rooms situated on this floor are expected to be the driest in the building.

In the first place, the ground itself is unusually free from dampness; ample provision has, however, been made for the removal of all surface-water by the introduction of six-inch drain pipes, laid with open joints, in trenches filled with loose stone, these stones covering the top of the pipe a few inches. These pipes run all around the building, just outside of the foundation wall, and are then carried to the manholes, where they are connected with the main sewer above the running-trap.

The ground under the floor of the school-rooms situated on the ground-floor is first cemented $2\frac{1}{2}$ inches with the best Rosendale

cement, and then covered with two coats of asphaltum. This asphalt is put on hot, and not only covers the entire bottom, but runs up on all outside and inside walls to the height of the copings, and is then carried across the top of all interior and exterior walls, forming an impenetrable protection against dampness. Not only is the ground-floor and the walls to the height of the coping treated in this manner, but all outside walls in the building—they are all coated to their full height and width with two coats before they are furred. This I believe to be a more perfect safeguard against dampness than the common hollow wall.

STAIRCASES.

The staircases consist of four flights; two at either end of the building. While being convenient and easy of access from all parts of the building, they are yet sufficiently isolated to be free from the usual objection of noise, and are moreover absolutely fire-proof. They are constructed with iron treads and risers, securely fastened to string-pieces, also of iron, that are bolted directly to the brick enclosing-walls. The top surfaces of all treads are to be covered with rubber, to prevent slipping. All platforms and landings are to be formed of granite slabs 8″ thick. The stairs are formed with two "runs" for each flight, with landings midway, this being done to secure an easy ascent. The stairs are all 5′ 0″ wide; all landings 5′ 0″ × 11′ 0″, risers $7\frac{1}{2}$″, treads 11″; they are all well lighted at all points by ample windows placed on each landing. An iron hand-rail, bolted to the walls, runs around on all sides at a suitable height. There is no wood-finish of any kind, with the exception of door and window casings, in the staircase halls. The sidewalls are all of face-brick laid in black mortar with struck joints. These walls, when hard, are to be treated with a coat of liquid filler, and then varnished in two coats, thus forming a perfectly hard surface, not easily marred or soiled.

HAT AND CLOAK ROOMS.

In all our school-buildings of the present day, the hat and cloak rooms have been more or less objectionable, especially in wet weather. Children coming in with wet garments hang them in narrow rooms, poorly heated and lighted, and usually unventilated, where they are allowed to steam in a close and unwholesome atmosphere during the session, and at its close are put on by the child

in a worse condition than when taken off. An attempt has been made to remedy this evil in the construction of this building. In the main halls, which are spacious, and which are to be heated and ventilated in the same manner as the school-rooms, have been placed the hat and cloak rooms—two for each school-room. These rooms, instead of being lathed and plastered in the usual manner, are simply partitions of ash 8′ 0″ high, entirely open at the top, and so arranged, that only the supporting-posts run down to the floor. The portion of the partition between the posts is kept 4″ from the floor, giving a free circulation throughout these rooms. Damp or uncleanly clothing hung in these rooms during the session instead of being filled with the foulness arising from confined atmosphere will become purified by the constant circulation of pure air,—the impure air being disposed of through the main hall ventilators.

LIGHT.

All eminent writers on School Hygiene have called attention, and dwelt with much stress upon the importance of abundant light properly distributed in all our school-rooms. That the light should come from the left side and be introduced at nearly right angles to the floor-line is an established rule among those versed in school matters. Upon the actual amount of glass required by each pupil authorities differ. Dr. Lincoln states that the size of the windows, taken collectively, should equal at least one-sixth of the floor-space. Cohn, the German writer, requires one-fifth, or 30 inches to the foot. Some of the highest authorities require from 300 to 350 square inches of glass for each pupil; this coincides very nearly with Cohn, but Dr. Lincoln does not consider that, in our school-rooms that have a greater depth than those referred to by the above-mentioned authorities, the amount mentioned by them is enough.

In the Bridgeport school-house the window-stools have all been kept 4′ 0″ from the floor, and the window openings are carried up to within one foot of the ceilings. The size of the windows, taken collectively, equals, in the corner rooms, one-sixth of the floor-space, allowing 50 pupils per room, and gives 434 square inches of glass per pupil. In the middle rooms, the floor-space is seven times that of the glass surface, and, allowing 50 pupils per room, will give to each 403 square inches of glass. In the corner rooms the seats are so arranged that the light comes always from the back and left—in the middle rooms it comes only from the left.

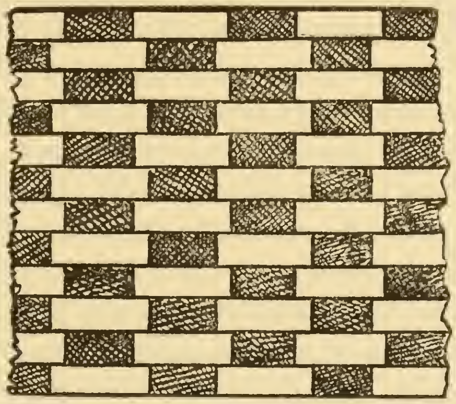
In the High School room, the glass surfaces, taken collectively, equal one-sixth the floor-space; allowing 200 pupils for this room, will give to each pupil 384 square inches of glass surface.

FLOOR, AND CUBIC FEET OF SPACE ALLOWED EACH PUPIL.

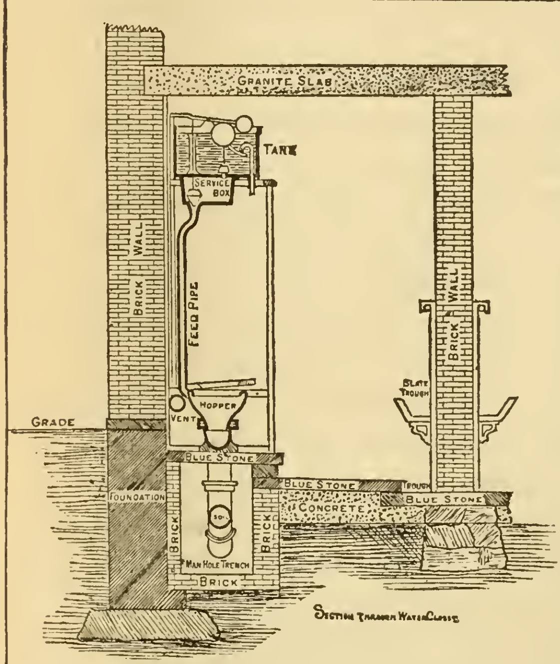
In the corner rooms, allowing 50 pupils per room, each pupil will have 20.50 square feet of floor-space, and 266 cubic feet of air. In the middle rooms each pupil will have 21 square feet of floor-space, and 273 cubic feet of air. In the High School, allowing 200 pupils, each pupil will have 17 square feet of space, and 441 cubic feet of air. While the floor-space in the High School room is somewhat smaller than the highest authorities require, the cubic contents are largely in excess of the most exacting, and it must be taken into consideration that this room is seldom occupied by the entire number of pupils for more than a few moments at a time, as the recitation-rooms used in connection with it are, during the school-session, in constant use. It should also be remembered that the number of pupils calculated for each room is their extreme capacity. It is to be hoped that no teacher will be burdened with more than 44 pupils, although I have based my calculations on a larger number.

THE WATER-CLOSETS AND THEIR CONSTRUCTION.

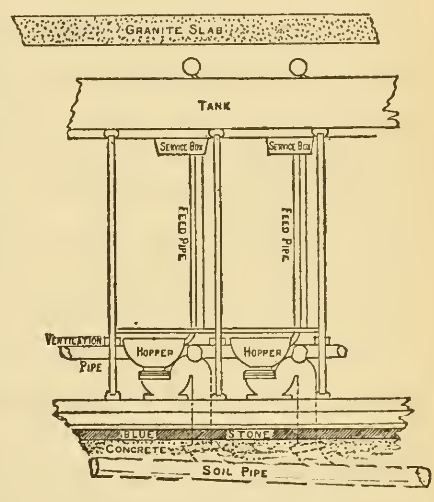
The demands of modern civilization require that we provide, either within our school-buildings or in close proximity to them, water-closets for the use of the pupils. There can be no doubt but that much harm is done to children, in many schools in our State, from the bad sewerage and careless arrangement of water-closets. It has been said that privies placed under the same roof which shelters the school should not exist, for a moment. I do not consider that this rule should be simply applied to privies, but that the groups of water-closets that are required in all our large schools should come under the same head; they should in no case be placed directly under school-rooms in the basement, as contamination will surely follow sooner or later. They should be, if not wholly, at least partially isolated from the building, and those for the boys removed as far as possible from those for the girls. The teachers' water-closets can, I think with safety, be placed in the building, that is if they are carefully ventilated; these water-closets will be used understandingly and are not liable to become unwholesome,



METHOD OF LAYING BRICK AROUND STOVES IN WATER CLOSETS



SECTION THROUGH WATER CLOSET



ELEVATION OF A PORTION OF THE CLOSETS

but the pupils' closets, even with the most careful watching, are liable to become foul from the habit so prevalent among children (I wish I could say that the habit was confined to children alone!) of making the closet a common receptacle for all kinds of garbage.

In the Bridgeport school-house, the closets for the pupils have been placed at either end of the building under the entrance steps, far removed from each other, securing a complete isolation of the sexes. They are also completely shut off from the main school-building by the intervening staircase halls; by this arrangement, ease of access is obtained, conbined with complete isolation, obviating the danger of contaminating the main school-building.

The water-closets have been constructed with a view to having as little wood-work as is possible with the requirements of comfort. The main-floor is to be of blue-stone flagging 4″ thick, laid in Portland cement; this is laid on a gentle incline to a certain point, to secure a good drip or wash from all points of the room. The side-walls are of brick, treated in the same manner as has been before mentioned in the description of the entrance-halls. The ceilings will be formed by the bottom of the granite slabs that are used for the floors of the vestibule, porch and outer halls. The casings, doors, and seats for the closets comprise the entire wood-work: these are of ash and are treated to a coat of filler and then varnished in two coats. The partition between each bowl is to be of slate 1¼″ thick, 7′ 0″ high by 2′ 6″ broad. These slate partitions are held in position by iron floor and wall-pieces and caps of the same material (see accompanying drawings). The floor upon which the closets stand is raised one step above the main floor of the closet (see drawing), and is also composed of blue-stone flagging 4″ thick, a hole being cut through this stone for the outlet of the closet. The closet that is intended to be used is the Hellyer Short Artizan Hopper. This closet combines more good points, in the writer's opinion, than any at present known to him. Its chief point of excellence is its simplicity of working, and the fact that it is entirely of earthen-ware. There are no pans, valves, or plungers to become foul or get out of order: it is, in fact, an earthern hopper of improved shape, fed by a continuous tank to which is attached for each bowl a serving-box. When the seat is occupied, by a simple device a valve is raised, and the serving-box filled with water from the tank, at the same time a small stream is permitted to trickle into the hopper, wetting the sides and preventing the adhesion of excretion to the bowl. When the seat is relieved of its

weight, the valve before referred to is closed, another one opened and the contents of the serving-box (some three gallons) suddenly discharged through a large pipe connected with the flushing rim into the bowl of the hopper, carrying all solid matter through the trap. As I have said before, these hoppers, both bowl and trap, are of white earthern-ware, they are to be securely bolted to the blue-stone and left entirely open and exposed to the view. The seat is supported by the slate partitions, on which are bolted slate cleats. The chain operating the service-box and the feed-pipe are both enclosed in an iron pipe, so as to be completely inaccessible to the pupils.

The tank and service-boxes are of iron, painted. Directly under the platform on which the hoppers sit, there is to be constructed a man-hole trench to be built of brick, coated with asphalt; the top is formed of the blue-stone that the hoppers rest upon. This man-hole is 2′ 0″ broad by 3′ 6″ high, and is large enough to permit of a man crawling through it to inspect the pipes. This trench is to have an iron register at one end for the admission of pure air, and at the other is connected directly with the ventilating-shaft. In this trench are to run the soil-pipes from the hoppers; these are to consist of 6″ cast-iron pipes with 4″ Y joints for each hopper. These pipes are caulked with molten lead and then covered with two coats of asphaltum to prevent rust. By the arrangement of this trench the soil-pipe and its connections are always accessible; even should a leak occur in any of its joints that was not at once discovered, the stench arising from such a cause would not enter the building but pass off through the ventilating-flue. The urinals are placed along the inside division walls; they are to be constructed with slate backs and troughs put together in the most approved manner, the trough being supported by brass brackets; the back is arranged with a neat cap of slate, under which is run a water-pipe perforated with small holes so as to secure the complete wetting of the entire back at all times. Underneath this trough, in the floor, there is another trough, the bottom and one side being of blue-stone and the other formed by the slate back; this trough has an inclined surface and is intended to carry off all drippings or slopping that may occur in or about the closets or urinals. At its outlet it is trapped with a deep running trap and then connected with the main drain. This arrangement will enable the janitor, at the close of each day's session, to thoroughly wash down with a hose the entire room.

Upon the inside walls of rooms that are occupied by these closets have been placed ventilating flues, two for each of the closets. These flues are of large size, and run up through the building, entirely independent of all other flues, to a point far above the main cornice-line. Through these flues the extension of the soil-pipes of each section of hoppers is carried, and there is also connected with these flues a vent-pipe, running under the seats just above the trap of each hopper. Lastly, the trench in which the soil-pipe runs is also cemented. The lower portions of the flues, that is, those parts of them that come directly in the rooms occupied by the water-closets, are enlarged into a circular form (see plans), this being done to permit of the introduction of a small stove in the bottom of each flue, and this stove is to be kept running ALWAYS, both winter and summer, as the writer believes that this is the ONLY WAY to secure a steady up-current at all times under the varying conditions of the atmosphere. The brick-work around these stoves is laid in open work (see sketch), and on the inside covered with wire netting. There is also an iron door provided for each flue. By this arrangement many points are gained: not only are the hoppers and soil-pipes perfectly ventilated, but any stench arising in the rooms is quickly removed by the strong up-current through the flues. Again, in the winter, these two stoves in each room will be ample for heating purposes, while in summer, by a simple device, the direct radiation is shut off from the room, and thrown entirely up the flue.

The teachers' water-closets, situated two on each floor, are to be of the same pattern as those described, fitted up in the same manner as the ordinary house-closets, but with special reference to their construction and ventilation.

NOTE.—The soil-pipes for the teachers' closets in the main building are laid in a trench in the same manner as described above; the main drain runs into a man-hole just outside of the building, where the three lines of soil-pipes (one from each section of hoppers, and one from the teachers' closets) are brought together just above a deep running-trap. This man-hole is covered with a blue-stone flag, is carefully ventilated, and easy of access. There is also connected, just above the trap in this man-hole, the rain-water drains connected with the leaders from roof, so as to secure during every rain a thorough scouring-out of all these drains and their connections.

The reader, by studying the accompanying plans and sketches,

will be enabled to readily understand the general arrangement and working of this system.

HEAT AND VENTILATION.

It is generally admitted, on all sides, that the most practical, economical, and surest way of heating our buildings, at the present day, is steam. Granting that steam is to be our medium, it next becomes a question of how it shall be used. There are, at this writing, two methods in general use, these being known respectively as the direct and indirect systems. The direct system means the placing of radiators or circulation-pipes in each and every room required to be heated. The indirect system consists in placing all the pipes or radiators in boxes in the basement. Pure, cold air is brought into these boxes, and by passing through the coils of heated steam-pipes is warmed to the degree required. The heat generated in these boxes is then conveyed to the various rooms through tubes or pipes, in the same way that heat is usually conducted from our ordinary hot-air furnaces. Both systems have many strong advocates, but as far as the writer's investigations and researches have led him, he has found, among men that have simply the heating of a room in view, the direct system in favor; but among those who have not only the actual heating, but the supplying of the room with fresh, pure air at all times, the indirect system is invariably adopted. From the personal investigations and practical experiments the writer has made from time to time, he is convinced that far better results can be obtained by this method than by any now known to him. It has therefore been adopted in the new building for this city. It may be said in objection to this system that the amount of fuel required to heat a given amount of space is largely in excess of that required by the direct plan; this is in a measure true, but not to the extent supposed. Again, it has been said that it is impossible to heat exposed rooms by the indirect plan, without an enormous apparatus. This also is a mistake, for neither is an extravagant use of fuel nor a gigantic apparatus required, if the apparatus is properly arranged and understandingly handled. The trouble has been not from the inability to produce heat, but from the extraordinary loss of heat, this being occasioned in many cases by the position of the introductory flues, and in other cases by that of the out-going ventilating-ducts. It should be our aim to utilize every

particle of heat entering the room before we allow it to escape; it is certainly folly to bring in vast quantities of pure, warmed air at the floor-level of a room, and send it out with equal rapidity at the ceiling-level, without having traversed the room, outside of an

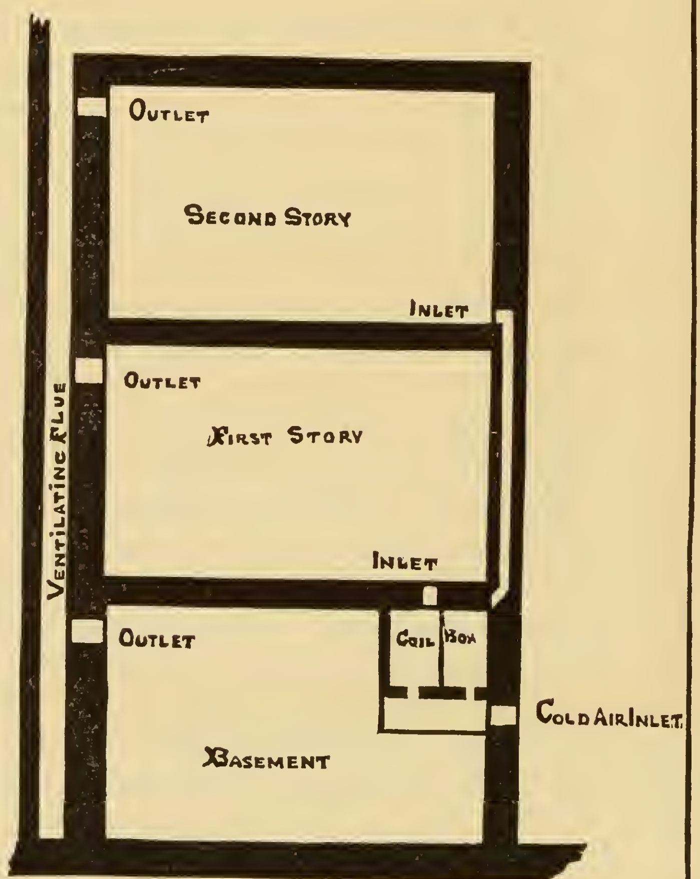


Fig 1

almost direct line drawn from the incoming to the outgoing register; yet in many cases our registers are so arranged that it is impossible to get any different results.

I have before said that there is a general unity of opinion among experts as to the feasibility of indirect heating, but in regard to the placing of the heating surfaces in the cellar, and the position

of the incoming and outgoing registers, there is a wide diversity of opinion.

I shall endeavor briefly to describe some of the principal methods in common use, and the objections that I have to them, before describing the system adopted in the Bridgeport school-building: the placing of the coil-boxes in the basement, on the outer walls under the rooms to be heated (Fig. 1), and the introduction of the warmed air at the floor and its removal at the ceiling-level upon the opposite side of the room. The objections that I have to this system are:

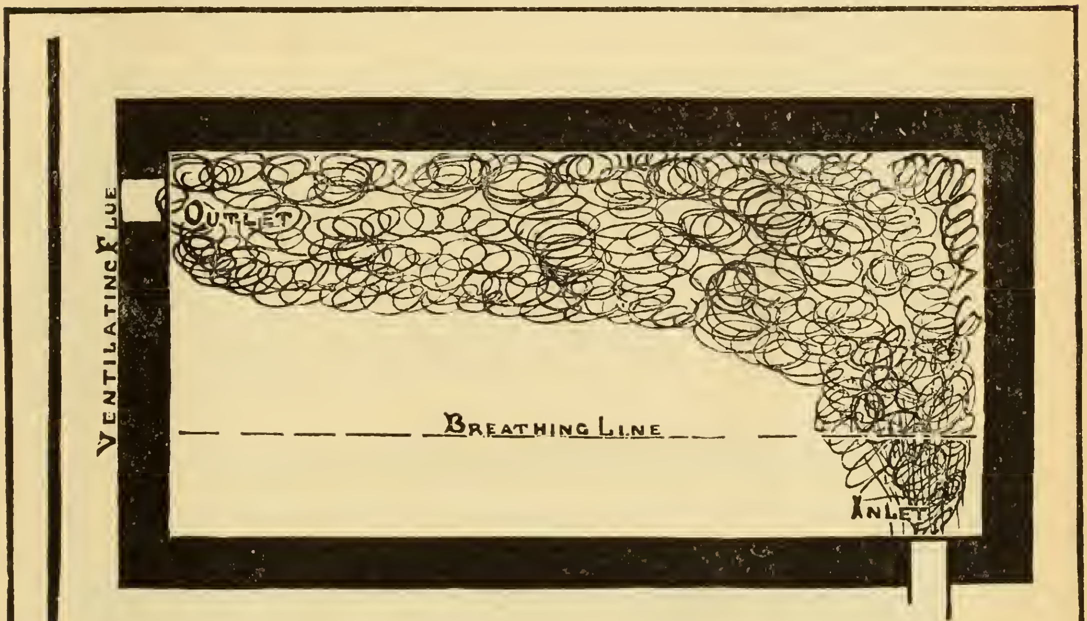


FIG. 2

1. That in a building like the Bridgeport school there would have to be placed in the basement at least six separate coil-boxes for the generation of heat, arranged one under each room: that by placing these boxes in the basement-rooms the rooms are rendered entirely unfit for school purposes, and their utility for play-rooms greatly crippled.

2. That by placing these boxes far away from the center of the building, where the boilers are presumably located, a large amount of additional piping becomes necessary throughout the basement.

3. The boxes being placed on the outer walls of the building, there is danger of the pipes freezing; constant watching and attention is required to prevent this and to insure their proper working.

4. That the introduction-ducts or flues running up the outer exposed walls of the building lose a great deal of heat by their proximity to the cold; that this loss of heat cannot be wholly obviated even by the most expensive construction; that a large addition to the actually necessary heating surface is required to overcome the loss of heat caused by the exposed position of the flues.

Lastly: That the air entering upon the outer wall at the floor, and being removed on the inner wall at the ceiling-level, does not benefit the occupants of the room as it should. The action of the air as it enters is rapidly upward to the ceiling, where it stratifies, then along its surface to the outlet, as indicated in Fig. 2. The

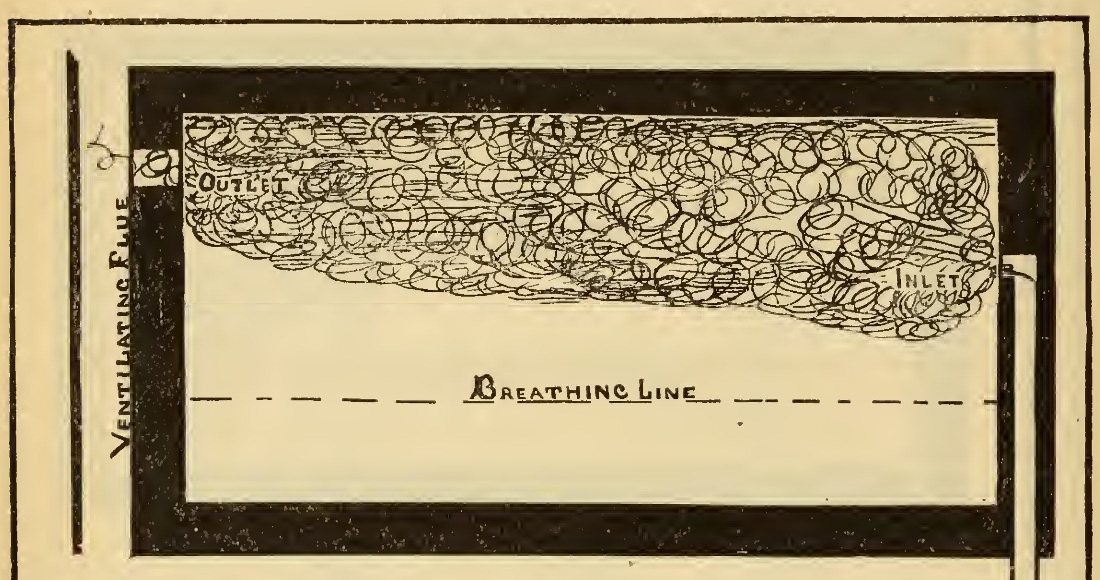


FIG 3

entering air is warm and light, and naturally rises and flows across the top of the room to the nearest outlet. The foul air of the room, being heavy with impurities, remains at the bottom, becoming constantly more contaminated. There is no doubt a certain amount of radiation or mixing is going on, but the great bulk of the pure warmed air entering the room takes the short cut across it and up the chimney, as shown in Fig. 2. This action of the warm air occasions, as may be readily seen, an enormous loss of heat, without accomplishing the very points aimed at, the utilization of every particle of heat before it is allowed to escape, and the thorough mixing of the pure incoming air with the air already in

the room. If any one doubts the correctness of the action of air as herein described, let him fill the incoming flue with smoke, that can be readily seen, and watch its course as it enters, flows upward

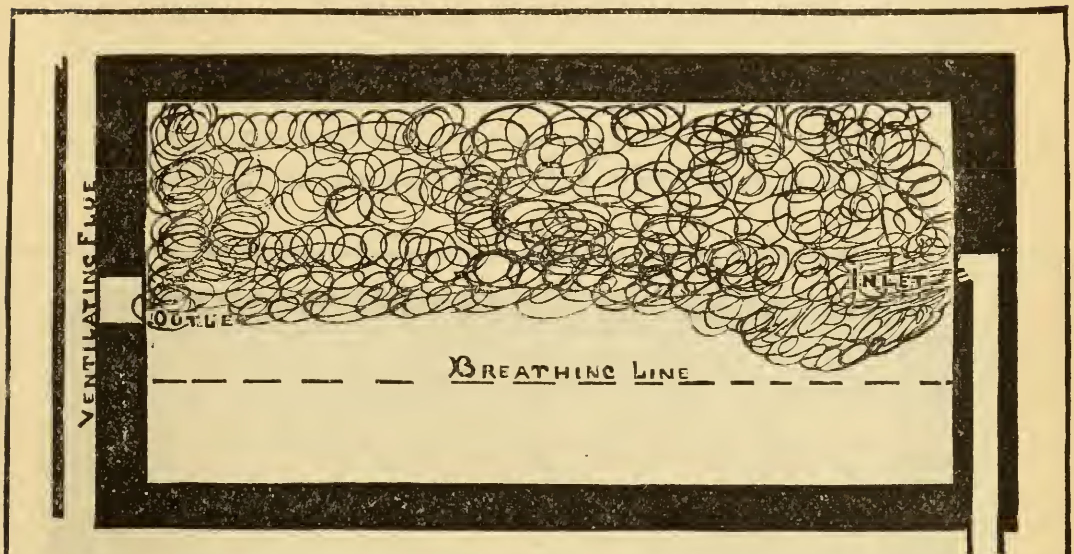


Fig 4

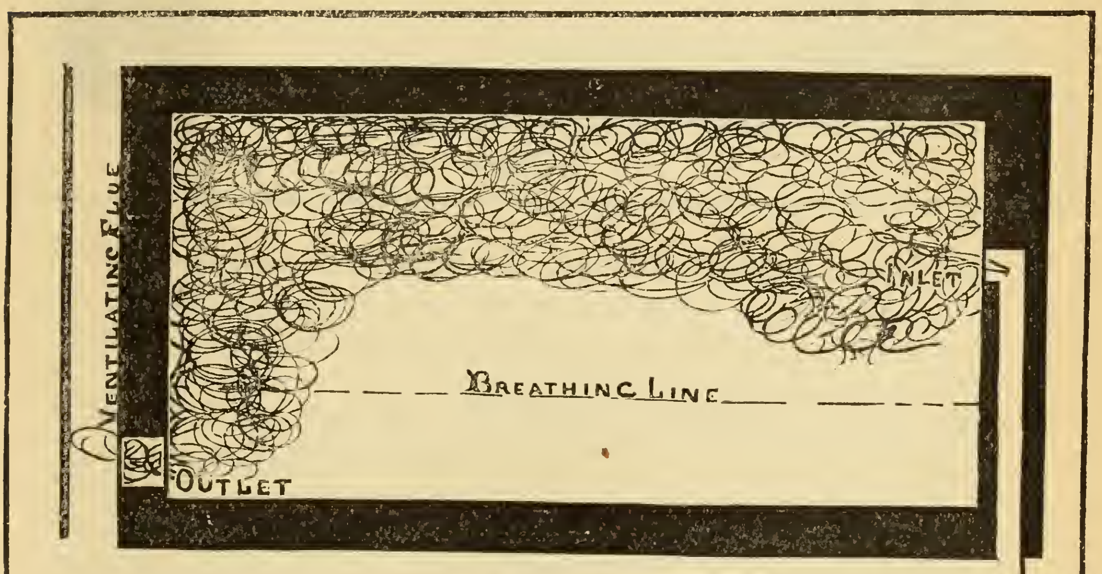


Fig 5

and outward, and see where the great mass of it goes. The dotted lines on this sketch indicate the breathing point of a person sitting.

It may be well to explain that in these experiments the outlets

have been at least *twice as large* as the inlets, and that there has always been heat in the outgoing flues to produce a strong up-current, as I believe this to be the *only* sure way to produce a constant outward flow of air. In Fig. 3, the outgoing flue is in the same position, but the incoming flue has been raised about two-thirds of the way towards the ceiling. In Fig. 4, the flues have been placed on about the same level, but with no better results. In Fig. 5, the outgoing flue has been placed at the floor with the results shown in the sketch. In Fig. 6, both flues are at the floor-level,

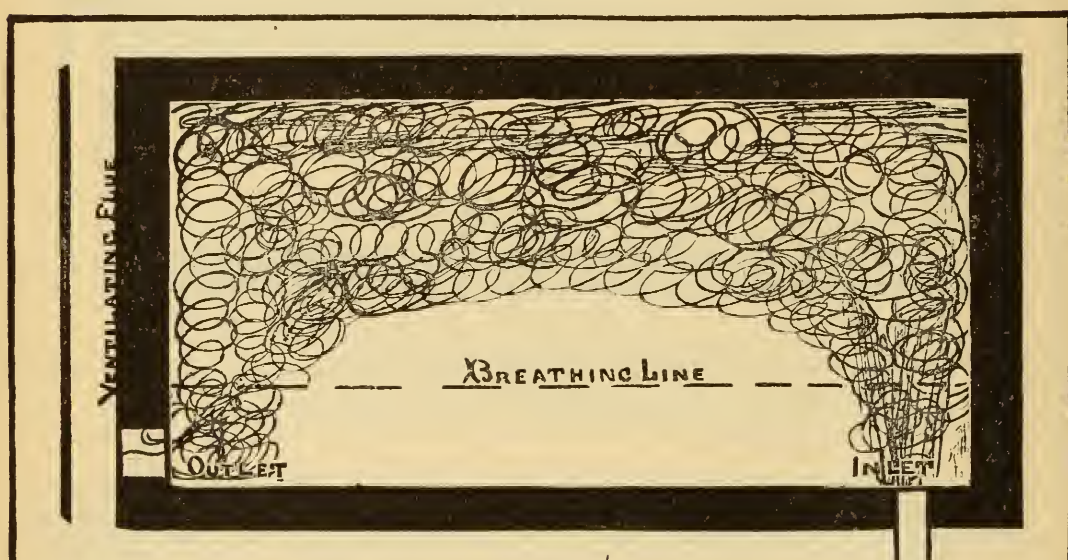


Fig. 6.

with better results than have yet been obtained, but still far from satisfactory. I have thus tried to show the general action of incoming and outgoing currents of air by the placing of the introduction-flues on the outer walls.

The second method in general use is the placing of the coil-boxes upon the inner wall, and the removal of the foul air at the opposite side of the rooms. I consider the placing of the coil-boxes on the inner wall, a great improvement on the other method, as by this plan they are centralized, extensive piping is saved, and the danger of freezing obviated. The placing of the exhaust-flues on the opposite side of the room I believe to be open to the same objections that I have described in the first method. The action of the hot air, from the points where it is introduced toward the various outlets, is the same as in the sketches already shown, and will be readily understood by the reader.

In the Bridgeport school the coil-boxes for the heating of the various rooms have all been placed in the main ventilating shafts in the center of the building, and the air conveyed from them through these shafts to the rooms by means of metal tubes. The air enters the inner corner of the room about eight feet from the floor, the corner being clipped (see plans) so as to form a flat surface for the register-opening; underneath the register the space is utilized for a closet for the use of the teacher. The outgoing flue has been placed directly under the platform, which is located

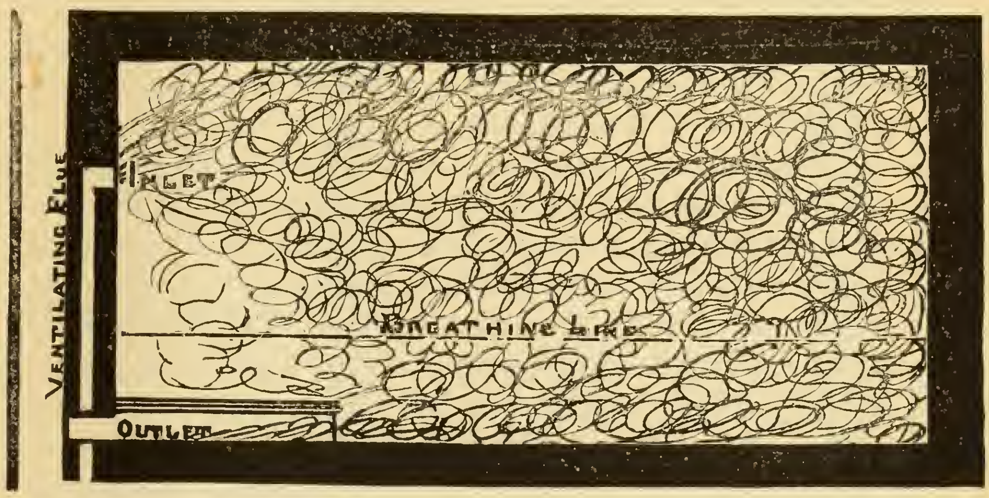


FIG 7

in the *same corner* as the introduction-flue. This platform measures $6' \times 12'$, and is supplied with casters, so that it can be moved at any time it is necessary to clean under it. Its entire lower edge is kept about 4″ from the floor, to give a full circulation under it at all points. The action of the incoming air is rapidly upward and outward, stratifying as it goes towards the cooler outer walls, thence flowing down their surfaces to the floor and back across the floor to the outgoing register. By this method all the air entering is made to traverse with a circular motion (see Fig. 7) the entire room, before it reaches the exhaust-shaft, and there is a constant movement and mixing of the air in all parts of the room. All the heat entering is utilized, and I believe that if the supply and exhaust-flues are properly balanced as to size, that there can be a very small loss of heat.

The inlets are all intended to be large, and the flow of air through them moderate and steady. The air is not intended to be heated to a very high temperature; the large quantity introduced is expected to keep the thermometer at about 68° at the breathing-level. The school-rooms contain on an average about 13,000 feet of air, or 260 cubic feet per pupil. It is proposed to supply each pupil with 30 cubic feet of air each minute, or 1,800 cubic feet per hour. Allowing 50 pupils to each room, this will necessitate the introduction of 90,000 cubic feet of air into the room each hour, and will change the air of the room 6.92 times within the hour, or once in about eight minutes. These calculations are based on a difference of 30° in the temperature.

In the exhaust-flues there are placed coils to produce a strong up-current at all times; heat is also obtained from radiation from the introduction-flues, which run through the foul air-shafts.

Trouble has always been found in regulating the supply of warmed air obtained by the indirect system, owing to the inability to control the heating surfaces. The usual way of constructing the apparatus has been to place in the coil-boxes sufficient steam-pipe to heat the room in the coldest weather. The pure, cold air passing over the pipes becomes heated to the desired temperature, and is then carried to the rooms; this answers very well during the coldest weather, but, as the weather moderates and less heat is required, the only way to regulate it has been to close the registers. This not only lowers the temperature of the room, but shuts off the supply of pure air entering. This fault has been remedied in the Bridgeport school-house as follows: The heating surface for each room is inclosed in separate cases or jackets (see Fig. 8) of metal, and are then subdivided into five sections, so arranged that any number of sections or the whole may be used at pleasure,—that is to say, that any one, two, or three parts may be used at discretion. In extreme cold weather the whole five sections are in use; in moderate weather two or three, and when a small amount of heat is required, only one. By this plan the supply of pure air remains always the same, but the degree to which it is heated is changed by the opening or closing of a valve. (See sketch.)

The arrangement of all the heating and ventilating apparatus in the center of the building renders it convenient and easy to manage, economical in its construction, and effective in working. The advantage is also obtained of having all speaking-tubes, call-

bells, and water-pipes run through the ventilating-shafts, where they are always accessible, as each shaft is provided with an iron

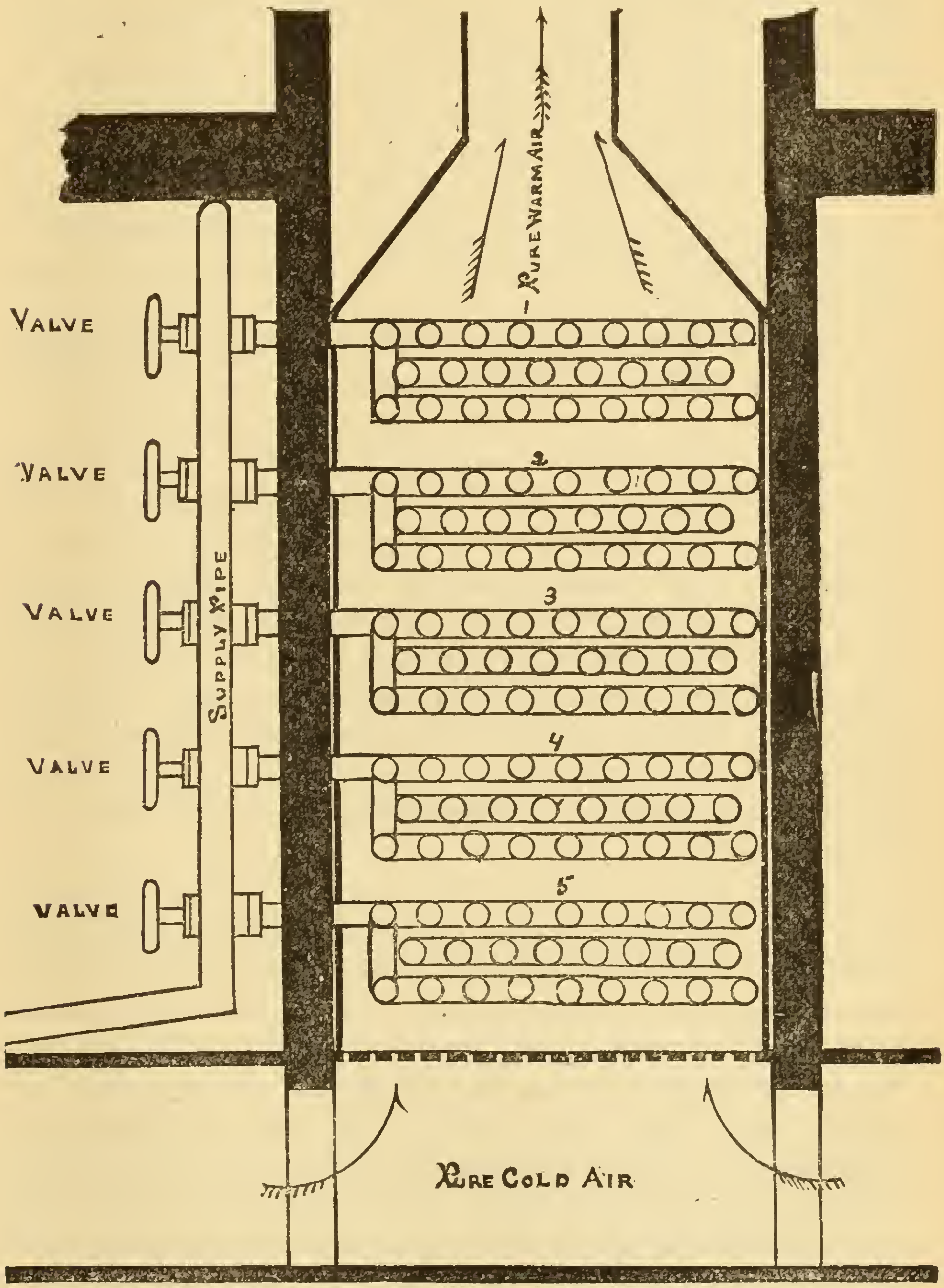


Fig 8

ladder. This system has not only been introduced into each room, but into the halls as well. There are placed, moreover, in the halls foot-warmers, that are indicated on the plans. These

warmers are simply steam-pipes encased in tin boxes arranged between the floor joists; the pipes are packed in sand to temper the heat, and are covered at the floor-level with checkered iron plates set flush with the floor. The tin cases referred to are water-tight and have a drip-pipe running down to the boiler-room, so that in case of a leak no damage may be done to the building.

The boiler-room floor is sunk some six feet below the level of the ground floor to insure a drip of all return-pipes from the coils. The cold-air inlets are on four sides of the building, the openings being about eight feet from the ground; these inlets are connected so that, whatever way the wind may be, a supply of pure cold air is always assured.

I have thus far spoken only of winter heating and ventilating; for summer ventilation I believe that there are no better inlets for the air than the windows. There are many devices that may be arranged in them that are simple and effective. It is not necessary to describe them here. The outlets, however, need a brief description; it is intended not only to use the outlet under the platform, but by a simple device the incoming register for warm air in winter is made to connect with the main outlet in summer, so that two outlets are provided during the warmer months. The upgoing current in the ventilating-shafts is maintained in summer, as well as in winter, by heat; there being placed at the bottom of each shaft a stove, which is to be used constantly when the boilers are not in use, insuring an equally strong up-current in winter as in summer.

I would say in conclusion that many interesting experiments have been made and important facts established. These experiments have principally been made with a model of about one-sixth the capacity of the school-rooms. They have always resulted most satisfactorily, and have proved to the writer the correctness of the principles herein advanced against the objections commonly raised that heat brought into the room on the inner walls will not sufficiently warm the outer walls. He would say that in every test yet made the registration of carefully graded thermometers has been from 1 to 2 degrees warmer near the outer wall than near the inner, showing conclusively that the flow of heated air is rapidly towards cool surfaces, and that if its volume is as it should be it will counteract the cold radiating from the outer walls and render the temperature of the air in their immediate vicinity comfortable. Many other interesting facts have

been learned, and much useful data obtained, but I have neither the time nor the space here to describe them. I have purposely omitted in this paper all figures not actually necessary, aiming to make it a simple statement of the writer's views, fortified by the results of actual experiments. If any should desire more minute details than are here given, by communicating with the writer he will willingly furnish all the information required, or should any be interested enough to come to this city, he will be pleased to go through with them some of the experiments.

The building has been described throughout as it was designed to be built by the architect; some modifications have been found necessary, however, on account of the meagerness of the appropriation.

PREVAILING METHODS

OF

SEWAGE DISPOSAL.

BY

PROF. C. A. LINDSLEY, M.D.,

MEDICAL DEPARTMENT YALE COLLEGE, DECEMBER, 1880.

PREVAILING METHODS OF SEWAGE DISPOSAL.

If it was required to express the foundation principle of true public hygiene in one word, that word would be CLEANLINESS.

Cleanliness in its broadest, fullest, and also in its minutest and most particular sense. Cleanliness and purity of food and drink. Cleanliness of person and apparel. Cleanliness all about us. Cleanliness and purity of the air we inhale, of the water we imbibe, and of the soil we live upon.

How to secure this degree of cleanliness, not for individuals only, but for whole communities, is the most important problem in public hygiene.

Civilization, with all its boasted advances, has not wholly solved it. Indeed many communities which complacently imagine themselves to be types of the most advanced civilization, are living amid hygienic surroundings far inferior to those enjoyed by the despised nomadic races, and dwellers in tents. The refinements of modern life as exemplified in the houses provided with all the "modern improvements," have introduced along with the luxurious conveniences, new and unexpected perils, to which our more simple ancestors were not exposed.

It is not my purpose to decry the benefits of civilization, but rather to suggest, that with every step supposed to be forward and in the line of progress, there is a liability to peril, which may compel retreat, or a change in the direction of advance. A familiar illustration may be found in a majority of our houses which are provided with kitchen sinks, fixed basins, water-closets, and bath-tubs, distributed among the rooms and connected by conduits with the sewers or cess-pools. I speak advisedly when I say that a majority of our houses so provided, would be more wholesome places to live in, if they had none of these "modern improvements."

If the tenants, like their grandsires, should carry by hand all their filth beyond the portals of their homes, instead of pouring it

into a system of circulating pipes, permeating the walls and underlying the floors, and constantly emitting noxious gases to pollute and poison the air, they would escape some dangers to which they are now exposed.

Real progress is slow, experimental, every step to be doubted, tested, and proved. There is still a great deal of science to be applied to the art of plumbing, before we can introduce with entire security into our dwellings a system of pipes for the circulation of fluid-filth throughout their walls and ceilings.

Filth, located, stationary, lodged, fixed, not in motion from us, is uncleanliness. All the conditions of life, whether civilized or savage, result in the production of more or less filth. The whole secret of cleanliness is to remove it, and to remove it speedily and at once; it always grows filthier by keeping. As a little leaven leavens the whole lump, so filth defiles and pollutes whatever is even near it.

There are two ways of accomplishing its practical removal. The first and most literal is by transporting it bodily to a safe distance; and the other is by putting it in such relations with other things, that its character as filth is destroyed through the operation of the laws of nature.

Both methods are susceptible of satisfactory results, if careful attention is given to the proper means of accomplishment. But in many thousands of the homes of Connecticut no attempt whatever is or ever has been made to secure hygienic cleanliness by either method.

And in thousands of other homes in the cities of our State, where public sewers have been constructed, the attempt to carry off the offensive refuse of living through their agency has proved a failure in a hygienic sense, because of a wide-spread ignorance of safe methods of using them.

The writer is not aware that any considerable number of householders in the Commonwealth of Connecticut have attempted any systematic methods of destruction of the filth of housekeeping, through the operation of natural laws.

In communities and in densely populated places—towns and cities, the satisfactory removal of filth to a safe distance is beyond the practicabilities of individual effort. It is not possible for the members of a family to carry away their daily product of filth to such distance that it will be safe not only as respects themselves, but safe, also, as respects all other inhabitants of the city in which

they live. Such results can only be reached by some public system of carriage, by which all the members of a community may be served. In no other way is it possible. The system which has been most frequently adopted in large cities is the sewerage system aided by the free use of water. Skillful engineering is competent to devise plans for any city in our state, by which all its streets can be sewered. Most of the cities in the state have constructed more or less of a system of sewerage, but none have yet completed it to an extent adequate to the wants of all its residents.

What, then, of those citizens of Connecticut who have not the advantages of public sewers? They are, for the most part, those who make no attempt whatever, either to remove or destroy the filth accumulating about their houses. On the contrary, they unhesitatingly and deliberately collect it, and store it away carefully as a permanent deposit in excavations in the ground close about their houses, and they designate their vile repositories privy-vaults and cesspools. The dangers of such practices I have sufficiently mentioned in a special paper published in the last annual Report, entitled "Sanitary and Unsanity Conditions of the Soil."

A few who are not connected with public sewers, and who, for the most part, do wiser than they know, (more particularly with their kitchen slops,) instead of having the abominable cesspool, distribute such refuse widely about their grounds. Where the space is ample, and the amount limited, if care is taken that it is not thrown too much in one place, this is doubtless one of the best ways for its disposal, because thus it is brought rapidly in contact with the purifying action of the atmosphere, and oxdized, and what fails of this effect is absorbed in the processes of vegetation, so that all the deleterious properties of such filth are speedily dissipated under the operation of the laws of nature.

There are, also, those who consume in their kitchen fires a portion of their refuse, which, so far as it goes, is a most effectual method of destruction, but the method is limited to combustibles, and cannot include wash-water and dish-water and other forms of dirty liquids, which are often the greatest sources of soil pollution.

There is a method of disposal which might be oftener adopted than it is. It was first suggested by the Rev. Henry Moule, the inventor of the earth closet. It is sometimes called the "absorption drain system," but better known as the "sub-surface irrigation system." The only requirements to make it adaptable to any house is a gradual decline from the house to the adjoining lawn or gar-

den. It is thus described by Waring: * "The house drainage is discharged into a tightly connected and thoroughly ventilated tank. Its outlet pipe starting from a point one foot below the surface of the water, and about two feet below the capstone, passes out near the surface of the ground, and is continued by a cemented vitrified pipe to a point about twenty-five feet further away. Here it connects with a system of open-jointed drain-tiles, consisting of one main, fifty feet long, and ten lateral drains, six feet apart, and each about twenty feet long—their drains underlie a part of the lawn, and are only about ten inches below the surface. The slope between the extremes of the system need not be more than fifteen inches.

Mr. Waring has had the system in successful operation at his house at Newport for several years, and it has not been interrupted by the severest frosts of a New England winter. He has improved the method by substituting Field's flush tank, by which he secured an intermittent discharge and more perfect flushing of the pipes, and also a wider diffusion of the sewage. There is doubtless a great advantage in the intermittent discharge by means of which the liquid suddenly saturates the soil, then gradually soaks away; the atmospheric air follows as the water subsides and oxidizes the more solid portions which the soil has filtered out. This copious intermittent discharge is every way better than the slow small trickling of dirty water.

Under circumstances favorable for the adoption of this plan it has proved reliable and effective. It is also capable of being greatly extended. The entire sewage of the village of Lenox, Mass., is thus disposed of in the most satisfactory manner.

HOUSE DRAINAGE BY THE PUBLIC SEWERS.

This is the method of filth disposal in which the people of Connecticut are largely interested; not only because it is already in partial operation in portions of many of the larger towns and cities of the State, but because it is expected to be the method upon which the citizens of large towns will depend in the future.

It is very desirable that every citizen whose house is connected with the public sewers, or who proposes to make connections, should have clear and definite ideas in regard (1st) to what he really seeks to do, and (2d) to the dangers he may be exposed to by doing it in a bad way.

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* Waring's Sanitary Drainage, page 196.

He seeks by means of the sewers and an abundant water-supply to remove out of and away from his house all the excreta and refuse of housekeeping which is soluble or readily floated in water. In so far as he fails of this he fails of his purpose.

The sewer is in the street, a drain forms a branch from it to his house, and from this drain are given off branches of smaller pipes, permeating through the walls and ceilings of his house to the various sinks, basins, and water-closets. Thus is established an open continuous way from several places in the interior of his house to the public sewer in the street. As his house is higher than the sewer, it becomes a simple matter to pour the refuse of the laundry, the kitchen, the bed-rooms, and the water-closet into these open pipes, and, as it is all the way down hill, they soon flow into the common sewer to go on to the sea, mingled with like discharges from thousands of other households.

Why is not this a perfectly satisfactory removal of filth out of and away from his house? Let us enquire why.

By the commingling in the sewer of such immense quantities of matter in ever changing proportions and kinds, and in all stages of putrefaction, the sewer may be considered, in the language of the chemist, as a vast *test tube* of prodigious proportions, stretching its stupendous length beneath the surface of the highways and ramifying its branches into all our houses. The activities of the liquid filth poured into it are not merely those of motion passing down a declivity, but they are activities of a widely different nature. Silently, persistently, yet energetically and inevitably, the laws of chemical action are set in operation, and among the products of the changes resulting from the contact with each other of such various matters are the formation of noxious vapors, recognized under the general term of sewer gas. Now as sewer gas is lighter than common air it flows upwards as naturally as water flows downwards. The immediate consequence is that the pipes leading from the several apartments of the house described become the conduits by which the sewer gas is conducted directly into those apartments, and sewer gas is filth—often in the most dangerous form. And so our fellow citizen has failed of doing what he proposed, but instead has really provided admission for a far more dangerous form of filth than he had before, viz., the gaseous products of sewage putrefaction.

To many persons it will no doubt seem incredible that such conditions as above described should be tolerated for a single day.

But exactly such direct connections have been made and do still exist, namely, a simple open and continuous pipe from the interior of houses to the street sewer. In numerous other houses the only attempt at protection from the sewer gas is by a piece of bent pipe, which is called a trap, made to hold an inch or two of water, placed under the sinks and basins. This mode of protection is so unreliable as to be utterly worthless in most instances. A little pressure, to which it may at any time be subject, will force such a trap; it will often be emptied too by syphonage; and in other cases if left unused the water will evaporate. Yet in hundreds of houses in this State this trivial contrivance is the only guard against the free inflow of sewer gas. Thus it is quite evident that the sewers constructed for public use to afford to our citizens the means of removing out of and away from their houses the filth of housekeeping, may ignorantly be so used that, while they do secure a prompt and convenient removal of such filth, they do also inject, as it were, into the very midst of our homes a form of filth more dangerous than that removed, and so subtle and intangible that its presence is not even detected, and yet often so laden with the germs of disease that diphtheria, scarlet fever, typhoid fever, and other fatal maladies are the sure event to those who dwell in such air-poisoned houses.

Even while writing this I find in a daily paper the following:

"A HEAVILY STRICKEN HOME.

"New York, January 2, 1881. Mr. S. C. owns a handsome house at Montclair, N. J. The house is fitted up with all the modern conveniences and appliances supposed to insure the health of occupants. A short time ago one of Mr. C.'s children, a boy six years of age, was attacked with diphtheria and he died last Sunday. Wednesday another son, aged eight, died from the same disease. Friday night a little daughter also died from diphtheria. A third son is very low with the disease, and is not expected to live; and Mrs. C. has also been prostrated. The source of the disease has been traced to the ventilating pipes, which by a faulty arrangement *received the poisonous sewer gases and introduced them into the house.*"

In support of the doctrine of the dangers of exposure to sewer-gas, I quote the following from Bayliss, on House Drainage and Water Service:

"No fact rests upon a broader and more substantial basis of

truth than that the gaseous emanations from decomposing sewage, commonly called sewer gas, are a fruitful source of disease.

"Whatever the agency by which it works, we know that it comes with the power and potency of death; escaping into the free atmosphere, its deadly power is quickly destroyed by the oxidation of its organic poisons; but, when it mingles with the confined air of our unventilated living and sleeping rooms, it retains its deadly power long enough to do its work effectually.

"Dr. Mapother, of Dublin, an eminent authority, states that there occur annually in England 140,000 cases of typhoid fever, of which 20,000 terminate fatally, which are clearly traceable to defective drainage and sewer-gas poisoning ; and yet typhoid fever is only one of a long list of prevalent zymotic diseases.

"If we look for the cause of the large mortality from zymotic diseases in our cities, we find it principally in sewer-gas poisoning. Other causes operate to swell the total, but to bad plumbing we may attribute the prevalence of pythogenic pneumonia, peritonitis, inflammatory rheumatism, typhoid and malarial fevers, croup, diphtheria, and many kindred diseases, which are almost epidemic in all our large cities."*

But the gases of putrefaction may be produced elsewhere than in the street sewers—aye, even within the walls of our own houses. The drain-pipes from our kitchen sinks and the bedroom basins are *little* sewers, and in a modern city house of average size these, with the soil pipes from the water-closet and the larger drain-pipe, into which they all enter in the cellar, present an aggregate superficial surface of many square feet. This surface is thickly and completely besmeared with deposits from the filthy fluids constantly passing over it. The gases generated here differ from those in the larger sewers of the street only in being more virulent from their greater concentration, because of less admixture with the common air. And these gases, made within the very walls of our houses, literally within the walls, are not stagnant, not motionless—they must move on to give place to constant new supplies ; no trap can stop them. Unless special provision is made for their free passage to the open air without, more or less of them will surely find their way to the air within the house. This is emphatically true of those drains connecting kitchen sinks, water-closets, etc., with unventilated cesspools. As well might one try to trap the neck of a bottle, and then fill it with wine without displacing

* House Drainage and Water Service: Bayliss.

the air in the bottle. There is evidence enough that cesspools, as usually constructed, are always sources of great danger, and even under the most favorable conditions of construction, are worse than the sewers. It is equally evident that the use of public sewers, by connecting them with the interior of our houses, is a matter of such vital importance that the work can only be entrusted with safety to men skilled and trained in the principles and practice of that branch of Sanitary Engineering. Protection from these dangers can only be considered complete with the perfect exclusion of sewer-gas from the house air. No trap has yet been invented competent to secure this result unaided by other means. In addition to good trapping, it is equally necessary to provide for the ready and unobstructed escape of all the gases generated anywhere, in any of the channels or drains carrying filthy liquids. And such escape of gases should be further promoted, and the said gases diluted, by such construction and arrangement of pipes and drains that there shall be a constant and free circulation of outdoor air throughout the whole system of piping within the house. The winds of heaven should sweep freely through it from end to end, absolutely separated by mechanical obstruction from the interior atmosphere of the house.

The following directions for the proper drainage of a house are taken from the *Plumber and Sanitary Engineer*,* one of the most instructive and valuable journals in its specialty that is published.

"In the light of present knowledge, the following seem to us the essential requirements for the drainage of every house. Time and further experience may suggest other features, or modification of these.

"Every house drain should have an inlet for fresh air, entering at a point inside the main trap, and carried to a convenient location *out of doors*, not too near windows.

"A trap should be placed on every main drain to disconnect the house from the sewer or cesspool. In places liable to unusual pressure from the sewer, it should be a double trap, with vent from between the two traps running up full size above the roof; or where the pressure from sewer is only occasional, and the rigor of climate will permit, this vent may be carried to the sidewalk or area, at a safe distance from the windows. If the first trap is forced, the gas can gain easier exit through this pipe than through the second trap.

*Plumber and Sanitary Engineer, Sept. 1, 1879.

"Every vertical soil or waste pipe should be extended at least full size through the roof. No traps should be placed at the foot of vertical soil pipes to impede circulation. Traps should be placed under all sinks, basins, baths, wash trays, water closets, etc., and as near these fixtures as practicable.

"All traps under fixtures, wherever practicable, should be separately ventilated, in order to guard against syphonage. Such vent pipes should not branch into a soil pipe below where any drainage enters it. In some cases it is preferable to carry it to outer air independently.

"Rain-water leaders should not be used as soil pipes, and when connected with house drains they should be made of cast iron in preference to galvanized sheet iron or tin, there being less liability of corrosion. Joints should be gas and water-tight, to preclude the possibility of drain air entering open windows.

"No safe waste should connect with any drain, but it should be carried down independently to a point where its discharge would indicate the existence of a leak or any overflow above.

"No waste from a refrigerator should be connected with a drain.

"Unless the water supply is ample, so that it will rise to every part of a building, ensuring at all times the proper flushing of fixtures and traps, a cistern should be provided into which the water will rise at night, or into which it may be pumped. Said cistern should be large enough to hold an ample daily supply, be kept clean, covered, and properly ventilated. The overflow pipe from it should *never* be run into any drain *under any circumstances.* The supply for drinking water should not be drawn from it, but from a direct supply, that is, direct from the street main.

"Water-closets should not be supplied directly from street pressure, or by a pipe from which branches are taken for drinking water.

"Where the valve closets are preferred to those that are supplied from a small cistern immediately over them, then the supply should be taken to a storage tank, from which it can be conveyed to the valves on the closets, thereby ensuring an equable pressure and securing more reliability in their working.

"All drain pipes within a house should be of metal in preference to stoneware, owing to the liability of the latter to crack, and the difficulty of keeping the joints tight. It is best to run them along the cellar wall or ceiling with a good incline. They should *never* be hidden under ground, as then leaks will not be perceptible. In some places it is common to paint pipes white, so that any leakage will show itself to the most careless observer.

"All drains should be kept at all times free from deposit, and if this cannot be effected without flushing, special flushing arrangements should be provided so as to effectually remove all foul matter from the house drains to the public sewers.

"All drains should be laid in a straight line, with proper falls, and should be carefully jointed and made water-tight. No right-angled junction should be allowed, except in the case of a drain discharging into a vertical shaft.

"No drain should be constructed so as to pass under a dwelling house, except where absolutely necessary; and then it should be constructed of cast iron pipes, with lead-caulked joints laid so as to be readily accessible for inspection and ventilation at each end.

"Whenever dampness of site exists it should be remedied by laying subsoil drains, which should not pass directly to the sewer, but should have a suitable break or disconnection.

"Water supply and drain-pipes should be concentrated as much as possible, and not scattered about a building. Horizontal pipes are objectionable.

"Plumbing fixtures should not be hidden behind walls and partitions, where their condition is never apparent. They ought properly to be open to view, and so situated that any leak would be readily detected.

"It is also well to have a plan of the plumbing of each house for the tenants' or owners' convenience and guidance in any emergency.

"In planning house drains they should be got outside the walls of the house as quickly as possible, so that there may be few joints of pipe, and the smallest chance of leakage from defects or accidents, taking proper precautions in locating to guard against freezing."

The foregoing requirements are practical, and the outcome of a long experience in overcoming the dangers involved in bringing into such intimate relations the interior of one's house with the interior of the great public sewers.

Now, in consideration of all the above, let us bring together a few propositions, and see to what conclusion they must lead us.

1st. The inevitable result of city life is the production of large amounts of refuse matter, commonly called sewage.

2d. The prompt and speedy removal of it is essential to the public health.

3d. Such removal by individual effort is impossible.

4th. Therefore, as a public undertaking, the sewers are provided for its removal.

5th. The use of these sewers by the people is always dangerous to health and life except certain precautions are carefully observed.

6th. The people are largely ignorant of these precautions.

Inference, reasonable and logical—Does not consistency demand that the authorities which have provided sewers to protect the people's health should also provide that said sewers shall not be a cause of danger to the people's health?

And yet there is no law in Connecticut forbidding our fellow citizens to commit suicide, and take the lives of their families, or prohibiting landlords from jeopardizing the lives of their tenants through exposure to the fatal influence of the public sewers.

It is a reproach to the intelligence of the civilization amidst which we live that some guard against this peril does not stand prominently upon the pages of our sanitary laws. If nothing be done by the authorized powers for the safety of those who are already in peril from their exposure to sewer gases, surely it is a species of crime to permit property owners through ignorance, or for any other reason, to go on unrestrainedly putting additional numbers of our fellow-citizens in danger by any further connections of houses with the sewers without adopting the safeguards necessary for their protection.

It it quite time something definite be done for public safety in this matter. While it may not be possible to prescribe a method of sewer connection which will always be devoid of danger, it is possible to prescribe certain safeguards which will greatly diminish these dangers, and, also, to prohibit certain methods of connecting, which are unquestionably often attended with serious and even fatal consequences.

Whether the necessary legislation upon this subject should be general or local is a mere question of expediency. The important fact is that the people need protection from perils to which they thoughtlessly and ignorantly expose themselves.

The whole subject of the safe disposal of sewage, and the risks to health and life attending some of the prevailing methods of disposal, is one of great and urgent importance. Public attention cannot be too soon or too strongly called to it. If the foregoing paper will contribute at all to this result it will accomplish the writer's purpose.

TRANSMISSION

OF

TUBERCULOSIS

FROM THE

MEAT AND MILK OF INFECTED ANIMALS.

BY

NOAH CRESSY, M.D., V.S., PH.D.,

HARTFORD, CONN.

TRANSMISSION OF TUBERCULOSIS

FROM THE MEAT AND MILK OF INFECTED ANIMALS.

By NOAH CRESSY, M.D., V.S., Ph.D.

Nowhere in the struggle of life, against the manifold causes of disease, do we more effectually imperil our health and happiness than in partaking of animal food of a suspicious character. Hence the relation of man to the lower orders of animals, which has caused so much speculation among philosophers and naturalists on certain zoological affinities, is equally interesting and instructive in a *pathological* point of view. The skeletal framework and internal organization of the higher mammalia are not only morphologically indentical with the structure of man, and thus subserve the same purpose in animal economy; but the blood is similar in chemical composition, contains the same anatomical elements, and is subject to analogous changes in disease; hence the liability of transmitting to the human subject some virulent blood-poison, through the medium of our animal sustenance.

The highest achievement therefore in medical science is the requisite knowledge to point out such causes, rather than vaguely search the materia medica for a cure; and there is no theme connected with the science of dietetics more worthy of our daily consideration than the sanitary condition of the meat and milk that we consume. Though many inquiries have been made in this direction, and valuable conclusions reached, yet in this broad field. for scientific research, the accomplished laborers to day are few. But the hour has come when the sanitarian and physician, in response to a public demand, must join hands with the veterinary profession to explore certain realms in the causation of disease, and thus more accurately survey those boundary lines in pathology which now seem to separate the human maladies from those of our food-producing animals.

Consequently, there is no subject of more importance to the pub-

lic health, or better calculated to enhance the cause of sanitary science, than the practical study of this diseased meat question. The very *doubtful* condition of some of our home supplies already indicates the solution of certain vexed questions on the *possible* transmission of tuberculosis, which has long been a stumbling-block to the medical practitioner. The investigation of this subject therefore, in all its varied relations, is a work of vast importance, and one which the age now urgently demands in behalf of human welfare.

Hence it will require, for the achievement of these necessary results, not only the united efforts of professional and scientific men, but the influence of the public press, and the sanction of our state authorities. Then may we hope to see a thorough system of veterinary inspection established in this country that shall have full control of the public markets, and thus examine all suspicious animals before they are allowed to be slaughtered.

INFECTIOUS QUALITIES DEFINED.

The extent to which the different kinds of diseased meat are liable to be used, will depend in a great measure upon the comparative frequency that these infectious maladies occur in a given locality, and the more insidious the nature of the disease the greater the liability of its transmission from animals being slaughtered, that are more or less affected. Hence a brief allusion to the more common forms of infected meat, with a review of some of the pathological conditions involved, will best serve our present purpose, and possibly throw a gleam of sanitary light on this much neglected subject.

All meat, therefore, from whatever source or condition of animal it may come, that would cause sickness, disease, or death in man if partaken as food, must be regarded in the light of sanitary science as *diseased*, and consequently unfit for human use in any form. Accordingly, an article of meat possessing such qualities, must come from an animal afflicted with some form of an infectious malady, the germs of which are contained in the flesh, and are liable to be transmitted.

Hence a disease in which a contagious virus is developed during its course, or a virulent principle generated in the blood, renders the meat from all animals thus affected exceedingly dangerous as an article of food. But meat is not materially affected by the entozoic maladies of animals, unless the parasite in some stage of its

existence makes its abode in the flesh and has not been destroyed by cooking.

In accordance with this definition there are but few diseases that absolutely render these animal supplies perilous to human happiness. Prominent among these may be mentioned malignant anthrax, hydrophobia, tuberculosis, small-pox, and two parasitic affections caused by the trichina spiralis, and the measle tape worms. But the other maladies from which our slaughtered animals are liable to have suffered, may greatly impoverish the nutritive quality of the meat, and thus render it unpleasant in taste and general appearance; yet, if the flesh contains no animal poison or other morbid products, no harm can possibly come from its use when served upon our table. And even a diseased article, when thoroughly cooked, may not prove injurious to one whose digestive powers are active.

It is not an easy matter, therefore, in all cases to decide whether meat is possessed of injurious qualities or not, without a careful inquiry into the history of the article, or a microscopic inspection. Trichinous pork is an example of this kind; and of the many fatal cases on record, none of the victims ever suspected the meat until a peculiar form of sickness made its appearance, involving a number of individuals who were known to have partaken of the same. This is also true of black-leg veal many times, and of other fine-looking specimens of meat that are affected with anthrax poison, which is liable to be transmitted.

Many varieties of diseased meat, however, are so palpable that even by the dexterity of the butcher's art it is impossible to disguise them. The tuberculous deposits upon the pleural membrane lining the chest cavity, thus causing the lungs to adhere to the ribs, or along the internal walls of the abdomen, are sufficient evidence to condemn the carcass. Measly pork and beef are also easily detected by the unaided eye; but the parasitic contamination of such meat is often overlooked, and consequently there is always an opportunity for a tape worm to become initiated in all who may partake of it.

TUBERCULOSIS INFECTIOUS.

As this disease is comparatively new to the veterinary profession, its clinical history and pathology has not received that attention which the subject now demands. In fact, few are aware to-day of the extent to which this insidious malady prevails, but the rapid strides

which it has made and the hold it has already gained on our stock, observes a well-known veterinary author, renders it one of the most important questions affecting the well-being of the bovine species.*

The *contagious* nature of tuberculosis, as shown by recent experiments on animals, can no longer be doubted, and it is now conceded by comparative pathologists that the bovine form of this disease is identical with that of man. Consequently there is great liability of its transmission, either by inoculation or ingestion. In fact, it has repeatedly been produced in rabbits, Guinea-pigs, and calves by feeding them with tuberculous matter. Prof. Gerlack of the Berlin Veterinary School claims,† as the result of his researches, that this disease in cattle is very infectious, that the presence of a specific virus is evident, and that even the flesh of such diseased animals under certain circumstances, and also the milk, possesses infective properties, though to a less degree than the cheesy matter from the lungs.

That tuberculosis is now rapidly on the increase no well-informed veterinarian can deny. It ranks among the few great scourges of the land; and though our losses, thus far, in live stock property have been largely due to other plagues which sweep their victims off in a summary manner, yet the ravages of this disease can only be realized, says Prof. Walley,‡ when we take into account the vast deterioration, the slow but certain decimation of many of our best herds, the destruction of our animal supplies, and also the danger to human life which can no longer be considered chimerical. Still there are many who from want of knowledge on the subject may even despise the pathological significance of this fell destroyer and thus ignore its deadly meaning; but when we see thousands of these tubercular deposits in a single slaughtered animal, we are forced to conclude that the use of such meat can in no way promote our healthfulness. Thus we have in every form of tubercle an implacable and destructive foe, and, in fact, there is no other morbid product known that is so *protean* in the number of functional derangements to which it may give rise in the animal economy.

* The Four Bovine Scourges, with an Appendix on the Inspection of Meat, etc., by Thomas Walley, M. C. R. V. S., Principal of the Edinburg Royal Veterinary College, 1879.

† The Veterinarian, London, March Number, 1875.

‡ Op. Cit, page 143.

HEREDITARY TRANSMISSION.

There is evidently a strong pre-disposition in neat stock for the production of tuberculosis, and cattle are far more frequently affected than other domestic animals. The temperament and physical confirmation undoubtedly contribute much to its development; for animals of a phlegmatic type, with an attenuated form, long limbs, and narrow chests are usually the first victims of the malady. Breeders should therefore strive to avoid the possibility of transmitting such diseased qualities. It is more frequent in cows than in oxen. and especially those kept in dairies for a length of time. Hence lactation is believed to be a predisposing cause. The condition also in which animals are kept is no small factor. The cold, damp sheds, the dark, underground stables, and other ill-ventilated abodes, as well as the character of the food, all conspire to rekindle those constitutional taints into morbid activity.

If we inquire further into the causes of the increased susceptibility to the infection, as seen more especially in our thorough-bred stock, we shall find that heredity and multiplied consanguinity play no menial part. Any physical weakness which the sire or dam may possess is liable to be transmitted to the immediate progeny, but if one generation escapes, the trouble may appear in the next, in accordance with the well-established principle of atavism. Diseased conditions are also inherited; and I believe that there is no predisposing cause which exercises such a potent influence in the production of tuberculosis as the pernicious system of in-and-in breeding. Thus from parent to offspring, from one generation to another, we often see the fatal tendency transmitted in unbroken succession, and the more complicated the relationship becomes, the greater is the virulence of the resulting products. In spite, therefore, of the many palpable examples of this broken law, some breeders still pursue, year by year, the suicidal policy of clinging to *one strain*, regardless of the impending consequences.

Hence this insidious and malignant malady, soon to be recognized as *the dreaded* scourge of our land, is now being disseminated in every direction through the consanguineous infection of our thorough-bred stock. And Prof. James Law, F. R. C. V. S., of Cornell University, in alluding to this subject, says, "That the *esteemed* qualities have been preserved, strengthened, and increased in this way there can be no doubt, but there can be just as *little* doubt that any inherited weakness or disease has been often trans-

mitted and even intensified. I could mention particular families in our highest-priced breeds in which *tuberculosis* has become a fixed character;" and further on he observes that "excessive weakness and stupidity of the young is another common result of in-breeding."*

CONTAGION BY CONTACT.

The observations of Dr. Grad, veterinary surgeon at Wasselonne, Alsace, on the spread of this disease by contaminated stalls, are very conclusive. On different occasions owners had informed him that they had lost several animals from consumption *in the same stall.* At first he did not attach much importance to the matter, but one day, when visiting the stables of an extensive farmer in Leinheim, he was informed that annually for the last five years one of the cattle had died of tuberculosis in a certain stall. The last one he had the opportunity of examining, which had been there but ten months, but had all the symptoms of the malady, greatly emaciated, and troubled with a cough. Dr. Grad's attention was strongly aroused at such a state of things, and to test the matter scientifically he was allowed to select an animal for an experiment. Accordingly he chose from another stable a three-year-old heifer, in calf, that was to all appearances perfectly healthy. She was bred on the farm, had never been unwell, never coughed, and none of her progenitors had ever been affected with phthisis. The cow remained quite well until after calving, when a slight cough appeared; but it increased in frequency, emaciation gradually set in, with all of the symptoms of tuberculosis, and in twelve months the creature was a mere shadow of her former self. The evidence therefore in support of this mode of infection Grad could no longer resist, as this was the sixth case that had occurred in this stall. Hence he very naturally inferred that the disease was probably transmitted by the ingestion of tuberculous matter expectorated by the cattle which had previously occupied the place.

The extension of the malady by cohabitation is therefore always liable to occur when animals are so arranged in the stable that the sick and healthy ones can get their heads together, or feed from the same manger. The hay may thus become contaminated, and the infection takes place through the digestive organs. The expired air also is not unfrequently so laden with virulent matter,

* Report of Am. Public Health Association, New York, 1875, vol. 2, page 250.

especially in the advanced stages, that it is not safe for another animal to inhale it. This mode of transmission, which was first suggested by Dr. Morgagni,* more than a hundred years ago, and has found many advocates among physicians and veterinarians, has now been confirmed by the experiments of Dr. Tappeiner of Meran, in causing animals to inhale the fine particles of tubercular matter from the air of a room in which the virus had been evaporated by a steam atomizer. Out of eleven puppies experimented on, ten showed well-marked miliary tubercle in both lungs on being killed within twenty-five to forty days—thus proving that this disease is contagious by the breath.

VILLEMIN'S INVESTIGATIONS.

In 1865 Prof. Villemin of the Val-de-grace Hospital, Paris, having conceived that human consumption in certain cases might be due to a specific virus introduced into the system, resorted to a series of experiments on animals to test the question. He was the first to demonstrate the contagiousness of tuberculosis by *inoculation.* Rabbits and Guinea-pigs were selected, and the material employed was from the human lung. Inoculations were made in various parts of the body, but the results were uniform and of a serious character. Many of the creatures died, others, lingering in a depressed state, were killed, when well-marked tubercular deposits were found in all, especially in the lungs, and with more or less infiltrations in the other organs, thus showing that the disease had been transmitted.

These results, which gave him so much renown as a pathologist, led him to experiment with tubercular matter from other animals. Desirous, therefore, of testing the nature of the disease in cattle, he inoculated a rabbit with matter from a cow. The animal became emaciated, and in six weeks was destroyed. Its lungs were filled with hard, tubercular masses, and some of them had taken on a cheesy aspect in the center. The other organs of the body were affected in a similar manner as those in the previous experiments. Hence he concludes that bovine phthisis is *identical* with that of man.

Dr. Villemin has likewise demonstrated that the tuberculous matter produced artificially by inoculation possesses the same power of transmissibility as when the malady arises spontaneously,

*See Fleming's able memoir on the history of these investigations in the 48th and 49th Vols. of *The Veterinarian.*

—thus proving conclusively that in tubercle resides a special, elaborated virus which does not lose its identity by several removes, no more than small-pox.

This view of the subject is corroborated by the pathological researches of Dr. Lionel Beale of London, the celebrated microscopist, who declares that tubercle is a minute particle of living matter, and if inoculated under favorable circumstances it is almost sure to grow, multiply, and produce other morbid cells like that from which it was derived. And furthermore, Villemin has always considered tuberculosis a *specific* malady, for he found that a very small wound and an inconsiderable quantity of matter used was a manifest proof that the intensity of the disease is independent of the *quantity* of the matter inoculated, and that the number and extent of the internal lesions have no relations to those at the seat of puncture. A disease, therefore, that can be transmitted from one animal to another by inoculation and thus an identical virus reproduced is, strictly speaking, *contagious.*

CHAUVEAU'S EXPERIMENTS.

Further and more convincing proof of the transmission of bovine tuberculosis has been furnished by Prof. Chauveau, of the Lyons Veterinary School, who for years has been experimentally studying the intimate pathology of the various contagia. The success of his researches has afforded some startling results pertaining to the use of diseased meat. The discovery, also, that certain rich virulent matter can infect as readily through the digestive organs as by any other channel has given him a world-wide reputation; and his well-designed experiments on cattle, which he instituted in 1868, have settled for ever among comparative pathologists the question of the virulency of tuberculosis.

He purchased four calves the 18th of September, from a locality where this disease was unknown, which, upon rigid examination, were found to be in fine, healthy condition. The next day he administered an ounce of tubercular matter from an old cow's lung, including the hard and soft varieties, prepared in the form of a drench and given in divided doses. The first one, a year old, began to lose condition in about a fortnight, the respirations were quickened, though the appetite remained unimpaired. On the 5th of October he gave this calf another dose, but of different and more recent matter, and within a week the symptoms of tuberculosis were apparent. Emaciation proceeded rapidly, the coat be.

came rough and staring, and the animal had occasional fits of coughing, especially after drinking.

The second calf, six months old, had on the fourth day a profuse and fetid diarrhœa, but of short duration, and the animal remained apparently healthy for three weeks. But the characteristic symptoms, as in the other case, soon appeared, with enlargement of the glands about the throat. The third one of the same age, having shown no signs of disease, was drenched again October 9th with another kind of matter, but this calf longest resisted the action of the virus, and not until the 25th was there any appreciable derangement of health ; but from that time, however, the phenomena of tubercular infection ensued with amazing rapidity, and in a week the calf could scarcely be recognized.

At the close of the experiments, November 10th, the miserable aspect of the three infected creatures, when contrasted with the thriving condition of the fourth, left no doubt in the mind of even the casual observer as to the changes that had taken place. The post-mortem examinations revealed a perfect generalized form of tuberculosis, with the local lesion of the bowels, *tabes mesenterica*, shown in a marked degree, some of the glands being as large as a man's fist. The morbid deposits in the chest cavity, also, were none the less remarkable. The lungs were studded with crude tubercles, some forty in number, varying in size from a pea to a filbert. The bronchial glands were also involved, but the liver, spleen, and kidneys were not affected.

Thus, in the space of fifty-two days, we have three typical examples, nearly uniform in appearance, of the artificial production of this malignant malady through the digestive organs. In presence of these facts, therefore, I trust that all inquirers after the truth of this matter will be forced to conclude with our illustrious pathologist that the virulence and contagious properties of tuberculosis are now demonstrated beyond a doubt. And the fact that bovine animals have contracted this disease through the agency of the feed gives us an additional source of danger, for creatures confined in the same stable or pasture, and drinking from the same ponds or troughs, are constantly liable to swallow some of this virus in the mucous discharges from the nostrils of their affected comrades. In fact it is never safe to put another animal in the same stall where one has sickened and died of this complaint without thoroughly renovating the apartment. Nor would I allow an affected creature to mingle with the healthy stock about the yard.

DANGERS OF DISEASED MEAT.

The meat from cattle affected with tuberculosis is not unfrequently seen in American markets, especially in our larger cities, and even in country towns. Yet, owing to the lack of public appreciation of any sanitary police measures to control such traffic, little or no complaint is made when we are served with consumptive beef. Seven years ago, after repeated opportunities for observation on this subject, I called public attention to the prevalence of this malignant malady among our dairy stock, that I believed was not generally recognized; and I now affirm with renewed assurance, in a pathological point of view, that the *baneful* consequences to our health from the use of infected meat and milk are not surpassed in the whole catalogue of contagious affections.

Such infected meat, therefore, should not be used; for any organ or texture in which tubercle has been deposited, is surely a dangerous article of food. Much will depend, however, upon the severity of the case and *extent* of the morbid changes that have taken place. Thus, from what is known in relation to the pathology of this virulent malady, we should at once interdict the sale of consumptive beef and milk, especially in the advanced stages of the disease, when the glandular tissues have become involved.

The relation of bovine tuberculosis to public hygiene was probably first suggested by Prof. Chauveau, who thirteen years ago had already indicated the real source of danger from the use of consumptive beef and milk. But no one has done more to promulgate these investigations, or has contributed more to the advancement of sanitary science in this direction, than George Fleming, F. R. C. V. S., Veterinary Inspector to the British army, and the accomplished editor of the London *Veterinary Journal*, who, by his encyclopædic writings, is an acknowledged authority on the subject. Thus, in a recent editorial, he says, "That the tuberculosis of cattle is a *transmissible* disease, and can be conveyed not only to animals of the same but also to those of other species in various ways, is now an *established fact*, upon the recognition of which we have for many years insisted; and, since we first called attention to it, some of the best pathologists in Europe have furnished additional testimony as to the readiness with which this transmission takes place, not only by *inoculation* or *ingestion*, but also, it would appear, by *cohabitation* of diseased with healthy animals.*

* *Veterinary Journal*, December, 1879.

Two years ago Prof. Colin of the Albert Veterinary College, contributed a series of observations on the *communicability* of tuberculosis, which were very conclusive, and threw a flood of light on this important sanitary question in relation to diseased meat. Several prominent German and Italian authorities have also published their clinical experience in this direction; and lastly we have the celebrated Professor Orth of Gottingen, furnishing the results of his researches and experiments. All of these are only confirmatory, however, of what has now been stated, but this confirmation is not without its value, especially in this emergency, when public opinion needs educating on the sanitary conditions of our meat supplies.

In his experiments, fifteen animals were fed with tuberculous matter from a diseased cow, and nine of those were infected, of which four died. The remaining five, becoming extremely emaciated, were killed. On examination nearly all the organs of the body were found involved in tuberculosis. In all the lungs were affected, but the serous and mucous membranes, the lymphatic glands, the liver, spleen, kidneys, and omentum were infected in different degrees. Consequently, the transmissibility of this affection to animals being proved, he insists that its transmission to man is possible, and has undoubtedly many times taken place.

TUBERCULOUS MILK.

The recent investigations of Prof. Otto Bollinger of the University of Munich, on the artificial production of tuberculosis as induced by the consumption of diseased milk, has thrown additional light on the subject. He claims that the milk of such animals has a pre-eminently *contagious* influence, and reproduces the disease in other animals experimented on from that point of view. He believes also that such milk, even when *boiled*, still retains its injurious properties. Further, he maintains that beyond doubt the tuberculosis of the human subject, though not completely identical with that of the cow, is yet strictly analogous to it, and that consequently the *wide prevalence* of tuberculosis in the native herds, at least 5 per cent. of which are affected, is a standing danger to health of the community.

Seeing the enormous mortality from consumption, more especially in towns, Prof. Bollinger believes it to be of the utmost importance to urge upon all classes, and particularly upon *farmers*, the absolute necessity of taking every possible means of *stamping*

out the disease among cattle. Meanwhile some measure of safety may be secured by the rigid exclusion of all *diseased stock* from town dairies, a measure which forms a prominent feature in the programme of the recently-established Associated Dairy at Munich, where all the cows are constantly kept under skilled veterinary surveillance, and any that may exhibit the least symptom of tuberculosis are at once weeded out.*

There is every reason, therefore, says Fleming, to *prohibit* the use of milk from cows affected with tuberculosis, and especially for *infants*, who mainly rely upon this fluid for their sustenance, and whose powers of absorption are very active. Even if it did not possess infective properties, its deficiency in nitrogenous elements, fat and sugar, and the increased proportion of earthy salts, would alone render it an objectionable article of diet. In fact, it has long been known that it was liable to produce diarrhea and debility in infants; but though many children fed on such milk have died from tuberculosis or a localized type of it in the bowels known as *Tabes mesenterica*, the part probably played by this liquid in its production has rarely been suspected.

He further observes, also. that, as the commencement of phthisis is generally so insidious in the human species, it is most difficult to arrive with any degree of certainty at the causes which directly induce or favor its development; but, from the evidence before us, it is to be feared that at least one of its sources must be referred to the utilization of the *carcass*, but more especially of the *milk*, of phthisical cattle as food. It is certain that tuberculosis is not uncommon and that it is a destructive disease among *dairy* cattle especially, and more particularly those in towns; that the udder of these animals is one of the glands not *unfrequently* involved; that infants and adults consume milk in somewhat large quantities,—and that phthisis is a very prevalent and fatal malady in the human species, and chiefly among the dwellers in towns and cities.†

Dr. Bromley of Lancaster, England, found characteristic tubercular lesion in the pulmonary organs of two pigs, which had been fed with milk of a consumptive cow; while the mother of the pigs, on being slaughtered, exhibited no signs of the disease. And therefore the pigs could not have contracted it by any hereditary influence, but the morbid virus was taken in with the milk.

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* *Veterinary Journal*, February, 1880.

† From *The Veterinarian*, vol. 48, p. 202.

Hence the necessity of guarding ourselves against such a diseased article of food.

Prof. Gerlach, Dr. Toussaint, and many other veterinary pathologists, have now demonstrated, by hundreds of positive experiments, that this milk is *infectious*, and contains a *specific* virus that can be transmitted from one species of animal to another, and from animal to man,* thus proving the *identity* of this dreaded bovine malady with that in the human subject.

SANITARY REGULATIONS.

The increase and sudden invasions of disease among our stock of late years should awaken new zeal in every farmer, and admonish the whole people of the necessity of having a vigilant inspector in every State, and authorized to act in every emergency. His decision, as a pathologist, should be *final* under all existing circumstances. The public must first be served. Its demands are absolute, and in the well-being of the greatest number the rights of individuals should never interfere. The want of such a sanitary organization has cost this country thousands of dollars on various occasions; and so long as our coast is allowed to remain exposed to the commerce of the world, without a veterinary surgeon at every port, it is purely a matter of chance whether or not we suffer from the malignant diseases of other lands.

Great Britain, after severe and repeated losses of her blooded stock, has seen the necessity of the adoption of such a sanitary measure for home protection. She has accordingly appointed professional inspectors at all the principal commercial points in her vast domain; and very recently, several important stations for pathological observations have been created by the British government. This was a noble move, and in the right direction; and we hope that other nations will follow her illustrious example in behalf of sanitary science. In fact, we need such encouragement everywhere. The general government should at once inaugurate and maintain similar positions in this country.

But we need not search in foreign lands to find a field for veterinary work that is unexplored. We have in the very midst of us

* The fact, as shown by Fox and others recently, that but 25 per cent. of the cases of consumption in man are due to hereditary transmission, while the other 75 per cent. are caused by unsanitary influences, gives increased interest and importance to all other methods by which tuberculosis may be caused. The origin of more or less of this large percentage is doubtless due to infection from milk or meat.—C. W. C.

a malignant disease among the cattle that is publicly almost unknown; and I fear that but few are aware of the increasing prevalence of tuberculosis in our milch cows. The nature of this malady is not well understood by the farmer, nor very much feared, though practically known as consumption. The cow that coughs, grows poor by degrees, even on the best feed, and at last fails in her milk, is frequently turned over to the butcher as the last resort. It is rare that an animal in this country is financially lost from this complaint. Some meat-vender will pick up these creatures at any stage of the disease for slaughter, and thus send the flesh to market; and as cheap lean meat is always in demand among the poorer classes, it is readily disposed of without complaint, whatever may be the ultimate effect of such a diet.

In fact, the traffic in diseased animals has now become so extensive that the State ought to control this matter by more active legislation. The public health has become involved, and the importance of a veterinary inspector, to thus protect our lives and health against the invasion of disease from this source can no longer be questioned. My attention has been called to this subject many times within the last few years, and recently even beyond the borders of this State. Hence, I have felt it my duty to thus publicly warn our people against the baneful practice of consuming the meat and milk of tuberculous animals.

The wide prevalence of this disease among our native herds and thoroughbred stock calls for immediate sanitary regulations throughout the country. Our infant population, and even adults, who are already rendered more or less infirm by their unhealthy surroundings and neglect of domestic hygiene, are now rapidly falling victims to this infectious malady, especially in our larger cities, as statistics show. Hence, in a moral point of view, this extensive invalid class should be protected. The subject, therefore, now demands the vigilant attention of our public authorities and of every sanitarian in the land.

In the absence of statistics, it will be impossible at the present time to estimate with any degree of accuracy the enormous extent to which this disease prevails among our dairy stock. But, if our calculations can be based upon the inspectors' reports in Italy, Bavaria, and other German states, we must conclude that *five* per cent. at least of our bovine animals are now affected, and with every facility for its rapid increase. Prof. Law, from his extensive observations, claims that in certain districts *thirty* per cent. of the

cattle suffer from tuberculosis, and with many high-priced herds this scourge yearly claims its victims.

In fact, Prof. Gerlach, in his experimental researches, was obliged to utterly discard certain strains of thoroughbred swine on account of the astonishing frequency of this disease among them. The sanitary supervision of this affection, therefore, will call for candid consideration and the deliberation of our most enlightened minds and professional experts, to devise and enforce such measures as will protect our tables, control this traffic, and stamp out the disease.

COLOR BLINDNESS:

BY

W. T. BACON, A.M., M.D.,

EXAMINING OPHTHALMIC SURGEON.

COLOR-BLINDNESS.

This defect in the visual power was for a long time denominated Daltonism, from a gentleman of that name, a victim of imperfect color perception, and one of the first to experiment on himself. This name is still used for imperfect color perception in some parts of Europe, but it is better known here as color-blindness. From the writings of Homer, some have thought that he might have been color-blind, and there is no reason for not supposing that this defect in sight has existed from the earliest times. About 1777, a shoemaker, by the name of Harris, called attention to color-blindness by stories of his own peculiarities in not distinguishing colors in the same way as other people. He says, that at the early age of four his suspicions were first awakened by picking up a stocking in the street, and carrying it to a neighbor who called it red, while he did not understand why that appellation was given it; it being sufficiently described to him by the name of stocking. While still young, he found that cherries on a tree were seen by other children, as of a different color from the leaves; while to him they only appeared of another shape. He is said to have been unable to name any color, but distinguished white from black, dark colors seeming to him black, but did not confuse light colors with black. Two of his brothers were similarly affected, while two other brothers and sisters enjoyed good color-perception. In 1790, an English chemist, by the name of Dalton, began the study of botany, and soon his expressions in regard to the color of flowers called the attention of his friends to his defective color-perception. A few years later he wrote on the subject: "It was not until I had pursued the study of botany for some time that I accidentally became convinced of a peculiarity in my vision. I was examining the pink geranium flower by candle-light, when it appeared to me what I called red, although by day-light it seemed an almost exact sky-blue. Friends, when asked, assured me that there was no great change in the color, by whatever light observed."

He further says: "I found most persons distinguish six colors in the solar image, namely, red, yellow, orange, green, blue, purple. To me it is quite otherwise. I see only two, or at the most three distinctions. These I call yellow, blue, and purple. My yellow comprehends red, orange-yellow, and green, of others, and my blue and purple coincides with theirs. Red appears to me little more than a shade, or defect of light. The difference between the green part and the blue part is very striking to my eye." A dark green cloth seemed to him of a muddy red color, darker than the grass. He matched red with green, and pink with green. In 1816 and 1818, two cases are reported by Dr. Nicholl, one a boy color-blind, and the other a man in middle life. The latter was unable to distinguish green from red, but could tell scarlet. Light yellow he recognized, but dark yellow was confounded with brown, though he could generally tell them from red. With the mistakes of the color-blind we might fill a volume, but a few of them may be of interest. There is a story of Dalton, many times published, but it is still valuable for illustration. He was a Quaker, and as a member of this sect opposed to wearing bright colors; still this modest and simple man, after having received a scarlet doctor's gown at Oxford, wore it in the streets several times, totally unconscious that he was not wearing the prescribed drab. Nearly all the color-blind that I have questioned on the subject say that they distinguish with difficulty strawberries on the vine from the leaves, or cherries on a tree. On one occasion, while examining railroad employés, I happened to be wearing dark red stockings, and while testing a color-blind person, after trying him on various colored objects in the room, asked him to name that of my stockings. He promptly replied, green. Another similar incident was narrated to me, namely, that a gentleman quite a number of years ago, when silk stockings and garters were worn, having lost one of a pair of red ones, went to a store to replace it, and returned with one red and one green. It was with difficulty that his friends persuaded him that he had not purchased a perfect match. It was not until 1837 that any attempt was made to divide the color-blind into classes. This was done by Prof. Seebeck, who permitted the examined to make their own comparisons, by allowing them to put together, from a number of colored objects, such as appeared to them of the same color. He used for the purpose a large number of pieces of variously colored paper, or glass. From his examination he made the following deduction, that there was a class who were

most insensible to the perception of red, also its complementary color-green, from the fact that they could distinguish them but little from gray, also from blue, which was confounded with gray. These distinguished yellow the best, but confounded light orange and pure yellow, deep orange, light yellowish, or brownish green, and yellowish brown, from light green, grayish brown, and flesh color, rose-red, green, rather bluish than yellowish, and gray, carmine, dark green, bluish green, lilac, and bluish gray, sky-blue, grayish blue, and grayish lilac. Another class he found quite like the first, in that they saw yellow best, red better, blue rather less than colorless, but especially confounded red and blue. The colors they confound are clear orange, brownish yellow, greenish yellow, and pure yellow, sealing wax red, rusty brown, and dark olive green; cinnabar-red and dark brown, dark carmine-red and dark bluish green; impure rose and pure gray; rose red; lilac, sky-blue and gray. He also first showed that there were degrees of color-blindness, the same as there were degrees in amount of vision for objects. Szokalski distinguishes five classes: those whose perception of colors is almost completely wanting; those who see yellow; those who also distinguish blue and red with yellow; those who do not perceive red; and finally, all those recognizing colors in a feeble manner, not being able to distinguish the mixture of two colors, but only seeing one of them.

There are two prominent theories in regard to color-blindness, viz.: that called the Young-Helmholtz, and the Herring, which we will briefly state. According to the first, there are three separate nerve-fibres, corresponding to these so-called fundamental colors, red, green, and violet. The sum of all the sensations which the eye is capable of receiving through these nerves is white, the absence of all sensation is black. But, while the fibre devoted to red is affected most strongly by red, it is, also, in less degree affected by green, and very feebly by violet. The green fibre may be affected in the same way by red and violet, more by the former than the latter, while the violet, though acted on principally by that color, is stimulated in less degree by green, and fully by red. All these colors are produced by a combination of these sensations, differing according to the proportions with which they are mixed. This theory recognizes three forms of color-blindness, according to the particular color-fibre lacking functional activity, viz., red, violet, and green blindness.

When a lot of wools, containing all shades of every color, is

shown a color-blind person, and he is told to choose from these all that appear the same color to him (lighter or darker), as the magenta sample, if he selects violets and blues he is red-blind ; if green and medium grays he is green-blind ; if red, purples and oranges he is violet-blind.

Herring assumes four fundamental sensations, namely, blue, yellow, red, and green. These result from two sources of sensation, each being capable of a double or reversible mode of excitation, thus producing the sensation of color complementary to each other. One source of sensation corresponds to blue and yellow, the blue ray exciting it in one direction, the yellow in the other. The other source corresponds to red and green in like manner. Normal-eyed persons possess both sources of sensation, while the color-blind have only one, namely, that corresponding to blue and yellow, leaving them blind to both green and red and all the compounds. We come now to the consideration of what the color-blind really see, and this is best learned from the testimony of one of them, namely, William Pole, who has studied the subject in himself and gives us his results. He says: "When thirty years old my attention was called to the nature of my color-perception, and I found that this defect was uniform to all color-blind persons. The color-blind have only two sensations, one excited by rays called by the world yellow, the other blue, hence all concur in giving these names to these respective colors. But their powers of vision do not end here ; they have a vast number of sensations differing from pure yellow and blue. In some cases yellow is intense and full, as in the buttercup, at other times pale, as in the primrose; so blue, as in ultra marine, again weak, as in the sky. White and black appear just as to the normal-eyed. The color-blind is capable of appreciating the intense varieties of shade caused by the mixture of white and black. The colors cannot be combined in the same sensation, for in the combination they tend to destroy each other. Hence, in a mixture of blue and yellow only the predominating color is seen. The color-blind, then, has: I. Pure white; II. Pure black; III. Infinite varieties of gray; IV. Yellow in great variety of intensities; V. Combinations of these with varieties of gray; VI. Blue in varied intensities; VII. Combinations of these with the varieties of gray. Such sensations as red, green, orange, violet, and their combinations, are unknown to the color-blind. Red and green appear not as red and green, but give false sensations. Red verging to scarlet gives the

sensation of a combination of yellow and gray, dark shaded yellow or yellow-brown."

If I take the reds that pass from crimson towards lake I see my other color come in—a faint blue—which increases until violet is reached, when it becomes more decided. There are examples where, from the red being very strong, the blue appears to lose its effect, and the impression given is colorless black or gray. The appearance of green to the color-blind corresponds exactly to that of red. Green, in its true aspect, is impossible to them, and consequently, when neutral, *i. e.*, unmixed with any other color, it presents to their eye the appearance of gray. When mixed with yellow they see only the yellow. From this testimony, it appears that to the color-blind, in whom there is least perception of red, all red appears darker. Greens are also darker to those whom that color chiefly troubles. Both confuse these colors with gray and each other. A mixture of white and black, in the proportions to represent the luminosity of any shade of green or red, will appear as such to the color-blind. Color-blindness may therefore be defined as an insensibility of the eye to the colors red and green, or yellow and blue (or violet), or an imperfect perception of one or all of them. As we are especially interested in the red-green blind, it will be understood that the term color-blindness, as hereafter used, applies only to those whose sensations of the two colors mentioned are blunted. Color-blindness is often hereditary. Many instances of families where several members were afflicted could be mentioned; one is sufficient. On one of the railroads in this state there were employed four brothers, three of whom I found color-blind both by the worsteds and flags.

It is usually congenital, but may be produced by disease of the optic nerve and retina. Excessive use of tobacco and alcohol have been known to cause it. Typhoid fever, brain disease, and accidents occasionally bring about this defect of vision.

About the year 1835 Dr. Favre commenced the examination of employees on the Lyons Mediterranean Railroad, but for many years his examinations were somewhat imperfect, owing to the lack of certain and reliable tests. The attention of Prof. Holmgren was called to these subjects in connection with railroads, in consequence of an accident at Lagerlunda, Nov. 15, 1875, which excited the public and lead him to think that color-blindness was in a great measure responsible for the disaster. Soon after he had an opportunity to test the matter, and found that out of twenty-

two hundred soldiers, about two per cent. had defective color perception. The same year he commenced examination of railroad employees, and found about 4.8 per cent. defective. Since that time he has examined over thirty-two thousand, and found a percentage of between three and four. Prof. Donders of Utrecht, Holland, found one hundred and fifty-two with defective color-sense among twenty-three hundred railroad employees examined. In consequence of the labors of these men, the railroads of Sweden, Holland, Belgium, and France are under the supervision of competent experts, who examine all applicants for positions, and thus all danger from color-blindness is removed. In this country the indefatigable labors of Dr. Jefferies has brought the subject to the attention of the public, and secured the passage of rules requiring an examination of all recruits for the army; pilots applying for a renewal of their licenses, and all persons in the navy. Quite a number of the railroads have caused their men to be tested in regard to their color perception—notably the Pennsylvania Railroad, Illinois Central, and the Boston and Lowell. These companies have taken advantage of the services of medical experts, and by their reports conclusively show the necessity of such examinations. Connecticut is the first State to legislate on the subject, having last year passed a law requiring all employees connected with the running of trains within her borders, to be examined for visual acuteness and color perception by medical experts appointed by the Governor, and under rules and regulations prescribed by the State Board of Health. These rules designate the tests to be used, which are those experience has shown the world over to be the most accurate in the detection of all grades of color-blindness, as well as the most convenient for employment. The one most to be depended on, and, as it seems to me, by far the best in every respect, is that of various colored worsteds devised by Prof. Holmgren. Berlin worsteds are generally used tied together in small skeins. These are of red, orange, yellow, yellow-green, pure green, blue-green, purple, pink, violet, blue, brown, and gray, several shades of each color, and five gradations of each tint, from the darkest to the lightest. The greens, grays, pale grays, shades of yellow, brown, red, and pink are especially numerous. The light browns and grays are called confusion colors, from the fact that the color-blind choose them to place by the side of the sample green. Besides these small skeins, which number about one hundred, we have three large ones, called sample colors. These are

a light apple green, a purple pink (magenta medium light), and bright red. rather toward a yellowish red. These colors Prof. Holmgren has selected with great care, the light green to determine whether the color sense is or is not defective, because, according to his theory and practice, green is the whitest of colors of the spectrum, and so most easily confused with gray. The magenta is chosen to determine which of the colors, red or green, is perceived with the greatest difficulty by the color-blind under examination. The reason for this choice is, that purple or magenta is a combination of two colors, red and blue, and in the eyes of a color-blind person appears, either as one of the two colors in the combination, or like gray. The red is used only as an auxiliary test. By employing a large number of small colored skeins, an opportunity is given to the normal eye for variety in their choice, while it affords a sufficient number of "confusion" colors to those of defective color-sense to allow them to make mistakes. The examination is conducted in the following manner: From the small skeins placed in confusion on a white cloth, the light green sample is separated a short distance, and the person being examined requested to select from the large pile any skeins appearing to him of the same color as the sample, either lighter or darker. If his color perception is good, he soon places the shades of green by the side of the large skein of that color.

Having done this accurately and quickly, his examination is ended, and his color-perception found to be normal. Should he hesitate, and begin to handle the colors without placing them by the side of the sample, he is told that you do not require an exact match; but anything looking like the large skein, of the same color. He then either makes the proper selection, or puts into his pile some of the greys, or light browns, and occasionally a light pink with a few greens. He is now asked to look over his choice, and satisfy himself that he has no skeins which in his opinion do not resemble the sample. Frequently, when asked this question, the color-blind will remove from his selection one or more green skeins, leaving the grey and brown. Having by his selection shown himself of deficient color-perception, he is then tried by the second test, namely, that of the purple or magenta. The large skein of that color is placed apart from the pile, and the request made that the worsteds resembling it be laid by its side. If the examined chooses the different shades of magenta he is only defective in his perception of color, but if he places by the side of the sample ma-

genta any of the light or dark shades of blue, or violet, or the light or deep shades of one kind of green, or grey, he shows himself color-blind to either red or green. When the scarlet sample is used the color-blind select, as of the same color with red, either dark green, dark brown, or light green and light brown. Should the one examined seem confused and not to understand what is asked of him, the tests may be gone through in his presence correctly. and he be requested to repeat them. It will be noticed that no names are used, but that the person tested is simply asked to place together colors which to his eye resemble each other.

The second test employed under the rules of the State Board of Health is that of Prof. Stilling, and called Stilling Isô-Chromatic Plates. The principle of this test is letters printed in colors, on a back-ground of another color, it being difficult or impossible for the color-blind to perceive the letters, while to one of good color-sense it is quite easy. These plates have a ground-work of one color, upon which are printed small squares of several colors, resembling somewhat a checker-board, the squares of like color forming the letter. There are quite a number of these plates, suited to detect the various degrees of color-blindness. The tints of some of these plates are so arranged that they appear very plain to the red-green blind. The average eye has no difficulty in deciphering them several feet distant, but one who has failed with Holmgren's test rarely succeeds in naming the letters devised to detect his particular defect. My habit is to show the examined the plates which are plain to him, and, when he has named the letters, turn to those of the other plates, and ask him what letters he now sees. I do not recollect a single case of complete color-blindness who could pick them out, but several of the incomplete color-blind could decipher some of the plates. Another test of some value is that called Donder's Spots. This consists of small pieces of paper, of various sizes, pasted on inch squares of black velvet, and these placed upon a back ground of the same material. The paper may be of any color the examiner desires, and are of the size of 1, 2, 3, 4, or 5 millimeters respectively. A bright red or bright green spot, in a good light, gives the appearance of a speck of colored light, and when using this test the remark has often been made by the person being tried that the object looked like a colored light. Prof. Donders by repeated trials established the fact that the normal eye could, in a bright light, distinguish the color of one of these spots 1 millimeter, or 1-25 of a inch, at a distance of about fifteen feet,

larger ones in proportion. With a little calculation the test can be used to express the amount of color-deficiency.

It is conducted as follows: the one examined is placed at a distance of say fifteen feet, and told to name the color of a spot five millimeters in diameter. Should he do so, a smaller one is placed on the velvet, and so on. If he calls the color wrong he is told to come a few steps nearer and try again, and again nearer, until you are satisfied that he sees right. Other colors are used in the same way. Care must be taken that the one being tested does not look too long at the spot, for should he do so he will develop the complementary color. It is a good plan to have him come nearer and again name the spot after he has called it right; otherwise a correct guess might deceive you. After examinations had been carried on for about a month, the rules were modified by the Board of Health, and those rejected by the above tests were allowed a trial with flags and lanterns in use on the road, placed at a distance of eighty rods. The examination with flags, which I principally used, was conducted in this manner: Each of those to be tried were furnished a piece of paper numbered from 1 to 9, and one of the officers of the road with a similar slip. The flags were displayed at a distance of eighty rods, both moved and held still. As the first flag was shown, each of the above-mentioned recorded the color as it appeared to him, and against the number. After the flags were shown nine times, each one being recorded, their names were signed to the paper, and comparison made. A list was also made of the order in which the flags were to be shown. By this method the sight of the color-blind was compared with that of one of his own officers, and not with that of the examiner. 1,020 were examined by Holmgren's methods. Of these thirty-five showed themselves blind to red or green,—about $3\frac{1}{2}$ per cent. Of the thirty-five, twenty-four requested and were given a trial by flags. Of these, twenty one were unable to accurately name the color, a much larger number than I should have supposed, from the untrustworthiness of the test. In view of these results it may be asked, Why is this test with flags and lanterns not the most practical method for the detection of the color-blind on railroads? There are several objections. First, the amount of time consumed, it requiring from ten to fifteen minutes for each test, more than is possible to give where large numbers are to be examined. Again, the results are totally unreliable, being affected by light and shade, as well as surrounding objects. On this subject we have the testi-

mony of others who have used them. Dr. Owens, who has examined the employees on the Illinois Central Road, says, after considerable experience, "I have no faith in the flag and lantern test," and relates a case of a man who had answered correctly for a time, as the flags were exposed, but on the examination being continued said rather hesitatingly, as the green flag was held out, "I should call that green." When asked, "Aren't you certain of it?" again, rather hesitatingly, "I should call it green." "Could you swear that it was green?" "Oh no," said he, "I could not swear to it." A bright red flag was then held up outside a building about 400 feet away, which he called green.

As to the methods of examination, Dr. John B. Hamilton, Surgeon-General of the Marine Hospital of the United States, in his annual report, says: The Holmgren test is the only one which has proved fairly satisfactory in detecting color-blindness among pilots. He mentions instances where persons who were found blind as to a particular color were subsequently examined by signal-lights, and furnished certificates. "The man who cannot distinguish green, but who knows red when shown two lights, red and green, is certain to make an exact guess as to the color he does not know." The doctor considers it better in every case to have the applicants prove that their sense of sight is acute rather than feeble, and at the same time he asserts that the assumption that the medical examiner has a peculiar and special interest in the rejection of a candidate is without foundation. He considers the examination by flags, and by lights, dangerous and uncertain, and believes that the scientific method, in that it actually detects defects, is preferable to the looser system, by which defects are overlooked. In testing for color-blindness with the above instruments, it should be proved that the men can distinguish not one or two lanterns or flags, but all those in use, and under every condition under which they could be discerned by the normal-eyed, which is a practical impossibility. If one in twenty-five are color-blind to red and green, this being the average of this defect in males, why, it may be asked, are not these mistakes more often noticed? This may depend to a certain extent upon the ignorance of people of normal eyes to the common names of colors, and in this way the defective escape detection. Then, again, when mistakes are made, they may explain that they are short-sighted to this or that color, and the explanation is satisfactory. Again, from education they may learn to associate the name of a color with the sensation it conveys to their

minds, whatever that may be, and speak of it as if it appeared to them the same as to others. They also, as Prof. Holmgren says, unconsciously seek in every way to supplement the chromatic sense nature has refused them. One color is to them paler than the other, and they accustom themselves to discern the difference in colors in the difference in the intensity of light. This was shown me by the remark of a man who, being asked the difference between a red and green sample of paint, both of which he pronounced red, said one was light red and the other dark red. In a similar way railroad men distinguish between red and green lights, the one appearing to them lighter than the other. This is all very satisfactory as long as the lights remain of the same intensity, but should any accident change this, immediately his judgment is reversed. We are often told that the railroad managers are the proper persons to examine their men, and that they have most at stake, should an accident happen from a mistake of signals. For this reason, if there is any danger from color-blindness, they would be the first to apply the remedy. Facts do not confirm these statements. It has frequently happened to me on detecting a color-blind employee to be told, "Yes, he is color-blind; we discovered it some time ago." Still this man is daily running on trains and using signals which he may at any time mistake, being kept there for the same reason that a defective rail is not replaced, or a bridge repaired, trusting to the chance that it may be safe a little while longer. That accidents are sometimes traced to color-blindness may be proved by the collision of the tug-boat Lumberman and steamship Isaac Bell, instanced in the report of the railroad commissioners for this year, where the pilot of the tug-boat has been since found to be color-blind, and that of the steamship reported so. An editorial in the *Courant*, speaking of a collision on the Northwestern Railroad, by which fifteen persons were seriously hurt, two probably fatally, says: This was precisely the sort of accident that would result from color-blindness. "The engineer failed to see the red signal until too late. As he is living he should be examined *critically* to ascertain if he is not red-blind. It only needs a few such disasters to convince the public that it is not unreasonable to demand that the men who are responsible for thousands of lives, and who must be kept out of danger by their keenness of vision, should know a color with certainty the moment their eyes fall upon it." It will be noticed, the demand is made that the examination should be a critical one, not by flags and

lanterns. The railroad accident at the Norwalk draw-bridge is still remembered by many, both on account of its horrors and from the fact that several prominent citizens of the State were killed. The draw was open and the signal to stop displayed, but the engineer disregarded it and ran his train into the river. A member of the legislative committee, which investigated the causes of this disaster, told me a few days ago that, according to his recollection, the testimony at the time of the trial showed that the red ball, the signal to stop, was properly displayed, but that the engineer mistook it for the green ball, which meant to go on carefully, and drove his train off the bridge into the river. Wm. Pole, in speaking of railroad accidents, narrates the following: An engineer who had been looking into the fire for some moments, saw a red light as a white one, and dashed his train on a siding, and into another one standing there, causing destruction of property and loss of life.

The examinations made in consequence of the law passed by the legislature of 1880, have pretty conclusively established the fact that one in about thirty of the men employed on the railroads of the State is color-blind to red or green. Other reports show that, the world over, the defect of the sight exists in one in twenty-five, and as far as it is known will so continue in the future.

It is not strange that those having this defect of vision should be unwilling to admit it when its existence will unfavorably affect their means of obtaining a livelihood, and will persistently deny it, even when proved by the tests selected by themselves. An instance illustrating this happened at the appeal of the employés to the Board of Health from the decision of the examiners. A color-blind fireman, while loudly asserting his ability to distinguish colors, was asked, by one of the committee of engineers present, to name the color of the top of the table by the side of which he was standing. He promptly replied, "Black;—you can't confuse me on colors;" although, to the eyes of most present, it was a decided green.

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OF THE

THIRD ANNUAL REPORT OF THE STATE BOARD OF HEALTH, 1880.

State Board of Health.

BUREAU OF VITAL STATISTICS,

STATE OF CONNECTICUT.

REGISTRATION REPORT

FOR THE

Year ending December 31, 1879.

NEW SERIES.—NO. 2.

Printed by Order of the Legislature.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1880.

State Board of Health

AND BUREAU OF VITAL STATISTICS.

DR. JOHN S. BUTLER, Hartford, PRESIDENT.

PROF. C. A. LINDSLEY, M.D., New Haven.

PROF. W. H. BREWER, New Haven.

HON. A. E. BURR, Hartford.

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HON. A. C. LIPPITT, New London.

DR. C. W. CHAMBERLAIN, Hartford, SECRETARY,
AND SUPERINTENDENT OF REGISTRATION OF VITAL STATISTICS.

State of Connecticut.

OFFICE OF THE
SUPERINTENDENT OF REGISTRATION OF VITAL STATISTICS,
STATE HOUSE, Dec. 1, 1880.

To His Excellency, H. B. BIGELOW,
Governor of the State of Connecticut:

SIR: In accordance with the laws of this State, I have the honor to submit the Annual Report relating to Births, Marriages, Deaths, and Divorces which occurred in Connecticut during the year 1879, from the returns required by law from the several towns..

The same general method has been pursued as adopted last year, with some additional facts not heretofore required in the abstracts, but of lasting value.

The assistance of Dr. H. S. Howe is hereby gratefully acknowledged in the compilation of the tables.

The tenth census has enabled us to add percentages which are approximately correct, and in most cases exact. I have the honor to remain,

Your very obedient servant,

C. W. CHAMBERLAIN, M.D.,
Superintendent Registration of Vital Statistics.

REGISTRATION REPORT.

1879.

The Report for this year is in several respects of more value than the last. The completion of the tenth census enables us to give the rates of births and deaths with a considerable degree of accuracy. The populations given are in many cases approximations, as the verified returns were not available when this report went to press. The errors are but slight, and not sufficient to change the rates, except beyond the decimal to which the published statements extend. In several towns the returns are so incomplete that the death rate appears excessively low. This is, in some instances, indicated by other inaccuracies in the returns, Connecticut is, however, for the most part, a very healthy state. her cities not over-crowded, and where there is considerable density of population, as in New Haven, an able and energetic local Health Board overcomes the resulting evil tendencies by efficient sanitary work, as shown by its death rate, lower than the other large cities of the state. There has been a marked increase in the accuracy of the returns this year, owing partly to the improved laws, and partly to the efforts of the Bureau of Statistics. Thus in Hartford over four hundred additional birth returns were secured; in New Haven several thousand that had heretofore passed unrecorded. Indeed, in the latter city, the records of births were completed for years back, and rendered nearly perfect. Similar results are reported in many different parts of the state. In the cities and large towns there is now sufficient inducement for the registrar to thus complete the imperfect returns, but in many of the smaller towns the difficulty still remains in securing complete birth-returns, and especially the full name of the child. As returned by the physicians eighty per cent. have only the last name of the child. This is nearly useless for purposes of identification, while answering well enough for statistics. Just how to meet this

evil is not apparent. When the doctor makes his return the child usually is not named, and in small towns it does not pay the registrar to canvass for them, while in large towns these, and those not returned by the midwives, make the labor sufficiently remunerative. As it is, this year, thousands of names have been secured that otherwise have been omitted, and several thousand added to the sum total of births, that usually have been overlooked.

In the returns of deaths the burial-permit law secures complete returns. Even where an occasional burial takes place before the certificate is obtained, it is invariably secured soon after, and but few, if any, escape record where this law is in force. It would seem that its value is so thoroughly demonstrated that it might be extended to include the cities and boroughs. Although it appears a little burdensome at first, its value in the prevention of crime, as well as in securing complete returns, commends it to the thinking people of every community. In many of the smaller towns, as East Hartford, for example, the returns of death, as well as of birth, have been completed by the direct efforts of the registrar.

In some instances nearly if not quite a third of the deaths are thus obtained. Sometimes the cemetery records are the only available source for completing the returns, which accounts for the large number reported where the cause of death is not stated. The physicians, it must be confessed, are remiss in returning deaths. The most glaring deficiency is found when a physician attends a patient in a neighboring town. In case death ensues, the return is scarcely ever made by the physician to the registrar of the town where the death occurred, and escapes record unless the registrar himself secures it. An amendment covering this was put in when the improvements alluded to before were made in the law, but was cut out by the engrossing committee of the legislature, so the evil continues unabated. This evil is especially felt when physicians in border towns come in from other states. Indeed it might be hard to meet this difficulty, but it might be remedied in our own state. As before stated, the importance of these records to every town justifies every reasonable effort that can be made to secure correctness and completeness. The vital history of each and every inhabitant is here epitomized, and the chief epochs in his life here recorded. The identification should be complete and unerring. Each year adds to their value, as the collateral evidence passes away, and the living witnesses in their turn have no other place than in a similar category. The valuable

deductions for sanitary and medical progress to be drawn from these records have been too often referred to in these pages to require further discussion.

In addition to the relations of age, sex, and nationality, the statistics of 1879 are discussed in relation to season, locality, and age at marriage of both sexes as far as may be, and also the age at maternity of native and foreign-born mothers, and the relative number of children borne by native and foreign-born mothers.

There are many facts that can be learned only from the publication of the tenth census that will be of great value in our next report. The only portion available this year is that relating directly to the population of cities and towns, and this has been utilized in preparing this report. It is to be hoped that we may have a State census also in 1885, as the population is so changeable in many parts of the State.

During the year 1879 there were 14,051 births, 552 more than in the previous year; 4,373 marriages, a gain of 88 over 1878; and 9,394 deaths, 42 in excess of last year. There were 316 divorces, 85 less than in 1878, a decided improvement resulting partly, no doubt, to the repeal of the omnibus clause in the divorce laws, as was predicted in the report of last year. It is to be hoped that the improvement will continue. This gives one divorce for every 14 marriages nearly (13.8 exactly); last year, one for every ten marriages (10.6 exactly).

The sanitary history of the State during the year has not been very unfavorable. The relative frequency of zymotics has rather decreased. One rather singular fact is shadowed in the returns, that is, a periodicity in diseases of this class, visiting different places in their turn. Of course it is too soon to determine a fact of this kind, but it is decidedly outlined, and affords an interesting subject for study.

Indeed the science of epidemiology is at best exceedingly rudimentary, but it is a fascinating study, and includes many facts of vital interest and importance to mankind. The most decided progress has been made with reference to Asiatic cholera, and even here much remains to be learned and many facts to be discovered. The malaria that is gradually creeping over our State, however, presents a practical subject for investigation. There is one striking fact, although not sufficient to explain all its manifestations, and that is, it follows the river valleys—the Connecticut, Housatonic, Farmington, Quinnipiac, Hockanum, etc., and gradually extends back from them.

The deaths from accident and violence number much less this year. There have been no steamboat explosions, no extensive railroad disasters, no tornado to swell the list.

The daily average of natural increase was 12.9.

Daily average of births, m. 20, f. 18,—38.

Daily average of marriages, 12.

Daily average of deaths, 25.6.

VITAL STATISTICS OF THE COLORED POPULATION.

Counties.	Births.				Marriages.	Deaths.			
	M.	F.	N.S.	Total.		M.	F.	N.S.	Tot.
Hartford, - -	29	30		59	21	26	17	11	54
New Haven, -	28	31	1	60	38	31	46	2	79
New London, -	19	22	1	39	8	6	16	1	23
Fairfield, - -	24	17		41	8	10	13		23
Windham, -	10	8	4	22	2	8	12		20
Litchfield, -	6	10		16	5	5	4		9
Middlesex, -	4	2		6	1	6	2		8
Tolland, - -	3	1		4	0	2	1		3
Total, -	120	121	6	247	83	94	111	14	219

Excess of births over deaths, 28. This is much better than last year, when the deaths exceeded the births by 19. The total number of births also is larger by 26, the marriages by three, than in 1878, while the deaths are less by 21, a much more favorable showing.

TABLE 1.

BIRTHS, MARRIAGES, AND DEATHS IN THE SEVERAL TOWNS, FOR THE YEAR ENDING DECEMBER 30, 1879.

HARTFORD COUNTY.

TOWNS.	Population in 1880.	BIRTHS.										MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.													SEX.				NATIVITY.			
		Male.	Female.	Not stated.	TOTAL.	Birth-rate per 1,000.	Both American.	Both Foreign.	Am. Mother. For. Father.	Am. Father, For. Mother.	Unknown.	Both American.	Both Foreign.	Husband Amer.	Wife American.	Unknown.	TOTAL.	Both non-resident	Hus. non-resident.	Male.	Female.	Unknown.	TOTAL.	American.	Foreign.	Unknown.	Death-rate per 1,000.
HARTFORD	42,569	648	569	3	1220	28.6	544	555	75	46	...	222	86	33	34	..	375	48	12	376	326	11	713	523	129	61	16.7
Avon	1,057	4	11	..	15	14.1	13	1	1	...	...	9	...	...	...	..	9	...	1	8	7	...	15	14	1	...	14.1
Berlin	2,385	24	31	..	55	23.1	30	24	1	...	...	11	...	...	...	..	11	...	1	23	20	...	43	40	3	...	18.2
Bloomfield	1,346	14	12	..	26	19.3	18	6	1	1	...	6	...	...	2	..	8	...	1	4	11	...	15	12	...	3	11.1
Bristol	5,351	44	28	.	72	13.5	44	20	6	2	...	39	3	...	2	..	44	...	1	35	36	...	71	59	12	...	13.2
Burlington	1,224	9	7	..	16	13.	13	2	...	1	...	3	...	...	...	1	4	...	...	8	3	...	11	8	2	1	8.9
Canton	2,299	45	37	..	82	35.6	33	42	3	...	4	14	9	...	4	..	27	...	4	23	28	...	51	45	6	...	22.1
East Granby	754	7	4	..	11	14.5	11	...	...	...	...	2	...	...	...	..	2	...	...	3	3	...	6	6	...	...	7.9
East Hartford	3,500	28	30	1	59	16.8	38	12	5	1	3	20	4	1	3	.	28	...	2	36	33	1	70	56	4	10	20.
East Windsor	3,019	43	29	..	72	23.8	31	21	6	8	6	11	2	1	1	..	15	...	2	16	23	...	39	27	10	2	12.5
Enfield	6,756	74	59	..	133	19.8	47	40	23	18	5	27	9	3	4	..	43	8	13	58	61	...	119	19	32	68	17.6
Farmington	3,014	18	29	..	47	15.5	31	12	2	2	...	9	1	1	1	..	12	...	1	13	22	...	35	22	5	8	11.6
Glastonbury	3,580	29	28	1	58	16.2	43	11	1	3	...	25	...	1	2	..	28	1	2	15	14	...	29	26	3	...	8.1
Granby	1,340	13	13	..	26	19.4	23	3	...	...	...	10	...	...	...	..	10	...	2	5	11	...	16	11	1	4	11.9
Hartland	643	5	5	..	10	15.5	8	2	...	...	...	...	...	...	...	..	...	...	...	3	2	...	5	5	...	...	7.7
Manchester	6,468	98	63	1	162	25.	54	82	13	11	2	37	13	4	8	..	62	...	1	46	45	...	91	68	23	...	14.
Marlborough	392	3	4	..	7	17.6	6	...	...	1	...	1	...	...	...	..	1	...	...	7	3	...	10	9	1	...	25.5
New Britain	13,978	207	202	1	410	29.3	79	115	44	21	151	55	21	5	16	5	102	...	7	81	89	5	175	116	34	25	12.5
Newington	934	8	8	..	16	17.1	9	6	1	...	...	4	...	...	...	..	4	...	...	7	8	...	15	13	2	...	16.
Plainville	1,930	18	14	..	32	16.5	20	12	...	...	...	14	2	1	1	..	18	...	1	3	11	...	14	12	2	...	7.2
Rocky Hill	1,108	12	5	..	17	15.3	16	1	...	...	...	...	...	...	...	..	...	...	...	6	6	...	12	9	3	...	10.8
Simsbury	1,833	23	21	..	44	23.9	31	7	2	3	1	10	1	...	...	..	11	...	1	21	15	...	36	30	6	...	19.6
Southington	5,410	55	61	..	116	21.2	61	27	15	11	2	24	2	4	5	..	35	...	...	38	38	...	76	58	13	5	14.
South Windsor	1,902	20	19	..	39	20.5	23	11	1	3	1	6	...	...	...	..	6	...	1	7	10	...	17	16	1	...	8.9
Suffield	3,225	26	28	..	54	16.7	37	11	1	5	...	16	1	...	...	..	17	3	5	16	23	...	39	35	4	...	12.
West Hartford	1,829	13	2	..	15	8.2	13	1	...	1	...	1	...	...	...	..	1	...	...	14	6	...	20	19	1	...	10.9
Wethersfield	2,173	24	15	..	39	17.9	23	5	2	1	8	10	...	1	1	..	12	...	2	22	20	..	42	37	4	1	19.3
Windsor	3,056	32	25	..	57	18.6	35	12	7	3	...	7	...	...	1	..	8	...	2	25	28	...	53	43	10	...	17.3
Windsor Locks	2,331	27	22	..	49	21.	20	19	8	2	...	17	3	...	2	..	22	1	1	9	6	1	16	14	2	...	6.8
Total	125,406	1571	1381	7	2959	23.5	1354	1060	218	144	183	610	157	55	87	6	915	61	63	928	908	18	1854	1352	314	188	14.7

NEW HAVEN COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not Stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Americn.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Unknown.	MARRIAGES. Both American.	Both Foreign.	Husband American.	Wife American.	Unknown.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Unknown.	TOTAL.	Nativity. American.	Foreign.	Unknown.	Death-rate per 1,000.
NEW HAVEN	63,500	994	979	..	1973	31.2	687	660	158	83	385	299	106	31	62	..	498	38	7	558	504	..	1062	788	259	15	16.3
Beacon Falls	379	11	4	..	15	39.5	8	1	2	4	..	..	1	..	..	..	1	..	..	4	4	..	8	5	3	..	21.1
Bethany	637	10	5	1	16	25.1	16	..	..	..	..	1	..	..	..	..	1	..	..	5	5	..	10	10	..	..	15.8
Branford	3,047	45	37	..	82	26.8	52	27	3	..	..	16	4	1	2	..	23	2	..	25	25	1	51	38	13	..	16.7
Cheshire	2,284	22	21	..	43	18.8	27	9	3	4	..	7	2	..	1	..	10	1	..	13	23	..	36	29	7	..	17.7
Derby	11,652	138	141	..	279	23.9	86	146	34	13	..	42	22	5	12	2	83	4	..	74	70	2	146	119	27	..	12.5
East Haven	3,057	10	19	..	29	9.4	20	7	1	1	..	18	..	1	..	..	19	2	..	15	11	..	26	24	2	..	8.5
Guilford	2,785	28	22	.	50	17.9	34	11	3	1	1	17	..	1	1	..	19	..	..	21	12	..	33	30	3	..	11.8
Hamden	3,410	27	22	1	50	14.6	34	4	8	4	..	17	..	..	1	..	18	1	..	14	16	..	30	25	5	..	8.7
Madison	1,670	10	10	..	20	11.9	16	2	1	1	..	10	..	..	1	..	11	..	..	11	15	..	26	1	..	25	15.5
Meriden	18,130	273	236	2	511	28.1	166	274	51	20	..	75	38	9	18	1	141	11	3	143	153	1	297	226	41	30	16.3
Middlebury	688	7	2	..	9	13.	6	3	..	..	..	3	..	..	1	..	4	..	..	7	3	..	10	10	..	..	14.5
Milford	3,346	23	22	..	45	13 4	36	5	1	3	..	12	..	1	1	.	14	2	..	23	33	..	56	54	2	..	16.7
Naugatuck	4,281	60	45	7	112	26.1	36	53	9	14	..	17	9	2	12	..	40	6	..	25	22	..	47	37	10	..	10.9
North Branford	1,025	7	11	..	18	17.5	15	2	1	..	..	4	..	..	..	..	4	..	..	5	12	..	17	17	..	..	16.5
North Haven	1,763	20	9	..	29	16.4	19	6	..	1	3	7	1	..	..	..	8	1	..	10	11	..	21	20	1	..	11.9
Orange	3,341	24	28	1	53	15.8	26	22	2	3	..	15	..	1	1	..	17	3	..	22	18	.	40	35	3	2	11.9
Oxford	1,120	10	15	..	25	22.3	21	4	..	..	..	4	..	..	..	..	4	..	..	13	14	..	27	25	2	..	24.1
Prospect	483	6	8	..	14	28.9	13	1	..	..	..	3	..	..	..	..	3	..	..	5	7	..	12	12	..	..	24.8
Seymour	2,318	26	25	..	51	22.	23	14	10	4	..	16	1	1	..	..	18	..	..	21	11	..	32	29	3	..	13.8
Southbury	1,740	13	13	..	26	14.9	18	4	2	2	..	7	..	..	..	..	7	2	..	6	9	..	15	15	..	..	8.5
Wallingford	4,688	60	53	1	114	24.3	53	33	16	6	6	29	3	4	3	..	39	..	..	33	28	..	61	52	7	2	13.
Waterbury	23,019	253	261	6	520	22.5	185	230	76	23	6	88	28	10	14	3	143	2	1	137	149	5	291	212	70	9	12.6
Wolcott	493	6	4	..	10	20.2	7	1	1	1	..	2	..	..	..	..	2	..	..	3	4	..	7	5	2	..	14.1
Woodbridge	830	8	11	..	19	22.8	14	2	1	2	..	6	..	1	..	..	7	..	..	8	3	..	11	11	..	..	13.2
Total	159,686	2091	2003	19	4113	25.8	1618	1521	383	190	401	715	215	68	130	6	1134	75	11	1201	1162	9	2372	1829	460	83	14.9

NEW LONDON COUNTY.

TOWNS.	Population in 1880	BIRTHS										MARRIAGES.								DEATHS.							
		Sex.					Parentage.													Sex.				Nativity.			
		Male.	Female.	Not Stated.	Total.	Birth-rate per 1,000.	Both Amer.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Unknown.	Both American.	Both Foreign.	Husband American.	Wife American.	Unknown.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Unknown.	Total.	American.	Foreign.	Unknown.	Death-rate per 1,000.
New London	11,136	133	123	5	261	23.3	126	105	15	15	..	66	20	6	10	..	102	12	4	120	125	6	251	206	45	..	22.5
Norwich	21,145	238	235	..	473	22.3	187	218	41	27	..	118	35	16	19	..	188	9	8	181	197	..	378	280	98	..	17.8
Bozrah	1,155	9	9	..	18	15.5	8	7	1	2	..	4	1	..	..	..	5	..	..	10	5	..	15	14	1	..	12.9
Colchester	2,974	26	40	..	66	22.1	27	24	13	2	..	23	2	1	4	..	30	..	..	20	24	..	44	34	6	4	14.8
East Lyme	1,731	20	20	..	40	23.5	33	4	2	1	..	12	..	..	1	..	13	3	1	21	20	1	42	30	12	..	24.2
Franklin	686	8	2	..	10	14.4	9	1	..	..	..	4	1	..	..	..	5	..	..	7	2	..	9	8	1	..	13.1
Griswold	2,745	28	18	2	48	17.5	25	23	..	..	..	11	8	5	2	..	26	2	..	12	19	..	31	26	5	..	11.2
Groton	5,130	45	48	..	93	18.1	79	4	6	4	..	28	..	1	..	..	29	2	..	43	41	..	84	80	4	..	16.3
Lebanon	1,845	15	15	..	30	16.3	23	5	2	..	..	7	1	..	1	..	9	..	..	11	13	..	24	22	2	..	13.
Ledyard	1,373	13	16	1	30	21.8	30	..	..	..	..	12	..	..	1	..	13	..	..	16	12	..	28	27	1	..	20.3
Lisbon	630	3	4	..	7	11.1	5	2	..	..	..	2	..	..	..	..	2	..	..	5	3	..	8	7	1	..	12.6
Lyme	1,025	10	16	..	26	25.3	22	2	..	..	2	7	..	..	..	..	7	..	..	6	5	1	12	12	..	..	11.6
Montville	2,666	16	15	..	31	11.6	19	6	5	1	..	13	2	..	..	..	15	3	1	16	19	..	35	33	2	..	13.1
North Stonington	1,769	8	13	..	21	11.8	21	..	..	..	..	10	..	..	..	..	10	1	..	15	20	..	35	35	..	..	19.7
Old Lyme	1,387	17	11	..	28	20.1	24	1	1	2	..	11	..	..	..	..	11	..	..	8	11	..	19	19	..	..	13.6
Preston	2,520	10	21	1	32	12.6	28	2	2	..	..	4	1	1	1	..	7	..	..	12	22	..	34	20	4	10	13.4
Salem	575	2	5	..	7	12.1	7	..	..	..	..	3	..	..	..	..	3	1	..	10	11	..	21	20	1	..	36.5
Sprague	3,207	58	34	..	92	28.7	5	85	1	1	..	4	27	2	..	..	33	3	11	29	26	..	55	40	15	..	17.
Stonington	7,353	67	65	..	132	17.9	68	50	8	6	..	35	8	2	8	..	53	13	1	62	59	..	121	99	22	..	16.4
Waterford	2,702	18	23	..	41	15.1	32	9	..	..	..	13	..	..	1	..	14	..	..	15	8	..	23	23	..	..	8.5
Total	73,754	744	733	9	1486	20.1	778	548	97	61	2	387	106	34	48	..	575	49	26	619	642	8	1269	1035	220	14	17.2

FAIRFIELD COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not Stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Unknown.	MARRIAGES. Both American.	Both Foreign.	Husband American.	Wife American.	Unknown.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Unknown.	TOTAL.	Nativity. American.	Foreign.	Unknown.	Death-rate per 1,000.
DANBURY	11,619	99	103	1	203	17.4	111	57	26	8	1	72	7	5	9	..	93	4	2	78	85	10	173	133	19	21	14.8
Bridgeport	29,153	389	396	3	788	27.	327	207	97	47	110	130	32	11	25	2	200	17	23	223	218	11	452	355	82	15	15.5
Bethel	2,726	19	18	..	37	13.5	26	6	2	3	....	8	....	..	....	..	8	..	..	16	17	..	33	31	2	..	12.1
Brookfield	1,151	12	10	..	22	19.	16	6	....	....	....	4	1	..	1	..	6	..	..	8	6	..	14	14	....	..	12.1
Darien	1,902	16	10	..	26	13.6	19	3	2	2	....	9	....	..	1	..	10	1	.	6	11	1	18	12	4	2	9.4
Easton	1,145	3	9	..	12	10 4	10	2	....	....	....	7	....	..	....	..	7	..	..	9	7	..	16	16	....	..	13.9
Fairfield	3,748	38	27	..	65	17.3	35	17	6	4	3	15	3	3	1	..	22	1	..	25	26	..	51	44	7	..	13.6
Greenwich	7,956	48	35	..	83	10 4	51	21	8	3	....	13	3	5	1	..	22	3	..	39	47	..	86	64	22	..	10.8
Huntington	2,504	22	30	..	52	20.7	29	14	8	1	....	11	1	1	....	..	13	..	..	19	13	..	32	26	6	..	12.7
Monroe	1,157	7	1	..	8	6 8	8	....	....	....	....	7	1	1	....	..	9	..	..	3	5	..	8	8	....	..	6.8
New Canaan	2,674	27	35	..	62	23 1	43	13	6	....	....	12	....	..	2	..	14	5	..	16	16	..	32	29	3	..	11.9
New Fairfield	791	3	6	1	10	12.6	10	....	....	....	....	....	....	..	....	..	....	..	..	5	10	..	15	13	2	..	18.9
Newton	4,013	39	32	..	71	17.6	30	34	7	....	....	21	1	2	....	..	24	4	..	25	32	..	57	46	9	2	14.2
Norwalk	13,970	159	112	2	273	19.5	169	68	21	9	6	53	11	6	3	..	73	7	2	118	110	2	230	188	41	1	16.4
Redding	1,540	9	9	..	18	11.6	13	5	....	....	....	10	....	..	....	..	10	..	..	11	15	..	26	24	2	..	16.8
Ridgefield	2,028	19	16	..	35	17.2	30	2	1	2	....	9	....	..	1	..	10	1	1	16	13	1	30	26	4	..	14.8
Sherman	828	14	4	2	20	24.1	18	2	....	....	....	4	1	..	....	..	5	..	1	13	8	..	21	13	8	..	25.3
Stamford	11,417	114	103	..	217	19.	102	76	19	20	....	32	21	6	6	..	65	12	7	93	61	..	154	122	32	..	13.5
Stratford	4,251	20	15	..	35	8.2	25	7	3	....	....	22	1	..	2	..	25	4	..	19	15	..	34	29	5	..	7.9
Trumbull	1,323	5	9	..	14	10.5	13	1	....	....	....	8	....	..	....	..	8	..	..	8	9	..	17	16	1	..	12.8
Weston	918	6	11	..	17	18.5	15	2	....	....	....	6	....	..	2	..	8	1	..	8	6	..	14	13	1	..	15.2
Westport	3,477	39	21	6	66	18.9	43	17	2	3	1	19	2	1	4	..	26	4	..	22	33	..	55	47	8	..	15.8
Wilton	1,864	8	8	..	16	8.5	12	4	...	....	....	8	2	.	...	..	10	..	2	13	8	..	21	18	3	..	11 2
Total	112,155	1115	1020	15	2150	19.1	1155	564	208	102	121	480	87	41	58	2	668	64	38	793	771	25	1589	1287	261	41	14.1

WINDHAM COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not stated.	TOTAL.	Birth-rate per 1,000.	PARENTAGE. Both American.	Both Foreign.	Am. Mother, For. Father.	Am. Father, For. Mother.	Unknown.	MARRIAGES. Both American.	Both Foreign.	Husband Amer.	Wife American.	Unknown.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Unknown.	TOTAL.	NATIVITY. American.	Foreign.	Unknown.	Death-rate per 1,000.
BROOKLYN	2,308	25	30	..	55	23.8	27	26	....	2	....	12	2	..	....	..	14	1	..	11	17	..	28	27	1	..	12.1
Ashford	1,041	8	14	..	22	21.1	22	...	....	....	....	8	...	..	....	..	8	1	1	11	11	..	22	21	1	..	21.1
Canterbury	1,272	10	25	..	35	27.5	18	16	....	1	....	5	...	..	....	..	5	..	..	5	9	..	14	11	2	1	11.
Chaplin	627	8	8	..	16	25.5	9	3	2	2	....	1	...	..	....	..	1	..	..	4	7	..	11	11	....	..	17.5
Eastford	855	9	8	..	17	19.8	15	....	1	1	....	7	...	..	....	..	7	..	2	12	2	..	14	9	5	..	16.5
Hampton	827	6	6	..	12	14.5	9	2	1	...	....	3	1	..	....	..	4	..	..	6	4	..	10	9	1	..	12.
Killingly	6,921	81	83	1	165	23.8	64	83	10	8	....	27	23	2	1	..	53	..	..	61	66	2	129	112	17	..	18.6
Plainfield	4,023	61	49	1	111	27.5	41	65	1	1	3	17	19	..	1	..	37	..	..	29	31	3	63	52	11	..	15.6
Pomfret	1,470	11	13	..	24	16.3	16	5	....	3	....	11	3	..	....	..	14	2	..	12	15	1	28	26	2	..	19.
Putnam	5,828	117	86	4	207	35.5	59	111	16	15	6	31	19	6	5	..	61	7	2	50	51	..	101	71	21	9	17.3
Scotland	540	7	8	..	15	27.7	12	2	1	....	....	3	...	..	....	..	3	..	..	2	5	..	7	6	....	1	12.9
Sterling	958	7	6	..	13	13.5	8	4	....	1	....	4	1	..	....	..	5	1	..	6	6	..	12	12	....	..	12.5
Thompson	5,054	77	64	..	141	27.8	12	122	3	4	....	13	18	6	1	..	38	1	5	54	44	..	98	78	20	..	19.3
Voluntown	1,186	16	10	..	26	21.9	16	8	1	1	....	10	1	..	....	..	11	1	..	7	7	..	14	....	....	14	11.8
Windham	8,265	100	107	..	207	25.5	82	102	13	10	....	39	12	6	5	..	62	9	3	72	78	..	150	123	22	5	18.1
Woodstock	2,638	19	11	..	30	11.3	....	....	....	30	....	12	...	..	....	..	12	2	1	9	9	..	18	16	2	..	6.8
Totals	43,813	562	528	6	1096	25.	420	539	49	79	9	203	99	20	13	..	335	25	14	351	362	6	719	584	105	30	16.4

LITCHFIELD COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not Stated.	Total.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Amer. Mother. For Father.	Amer. Father. For. Mother.	Unknown.	MARRIAGES. Both American.	Both Foreign.	Husband American.	Wife American.	Unknown.	Total.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Unknown.	Total.	Nativity. American.	Foreign.	Unknown.	Death-rate per 1,000.
LITCHFIELD	3,410	27	31	..	58	17.0	39	17	....	2	....	24	1	..	....	..	25	2	..	18	15	..	33	24	3	6	9.6
Barkhamsted	1,300	8	11	1	20	15.3	18	1	....	1	....	8	...	...	....	..	8	2	..	6	9	..	15	13	2	...	11.5
Bethlehem	656	4	3	..	7	10.6	4	1	1	1	....	6	...	1	....	..	7	1	..	3	7	..	10	9	1	...	15.2
Bridgewater	708	5	9	..	14	19.7	12	2	....	....	....	6	1	..	....	..	7	..	..	3	3	..	6	6	...	...	8.4
Canaan	1,157	12	2	..	14	12.1	13	1	....	....	....	6	1	..	....	..	7	2	..	12	5	..	17	..	...	17	14.6
Colebrook	1,148	9	6	..	15	13.	9	1	1	1	3	3	...	..	....	..	3	..	..	14	10	..	24	10	3	11	20.8
Cornwall	1,584	17	12	..	29	18.3	23	6	....	....	....	8	...	..	....	..	8	..	..	6	6	..	12	12	...	...	7.5
Goshen	1,093	17	10	..	27	24.7	21	4	1	1	....	8	1	..	....	..	9	1	1	9	8	..	17	12	5	...	15.5
Harwinton	1,016	15	8	..	23	22.6	18	3	2	....	....	4	1	..	1	..	6	..	..	6	10	..	16	16	...	...	15.7
Kent	1,622	14	14	1	29	17.8	25	3	1	....	....	6	2	..	1	..	9	2	..	2	6	..	8	6	2	...	4.9
Morris	627	3	2	..	5	7.9	4	1	....	....	....	5	...	..	....	..	5	..	..	8	9	..	17	16	1	...	27.1
New Hartford	3,312	22	30	..	52	15.6	26	18	6	2	....	13	3	1	1	..	18	1	..	22	29	..	51	38	10	3	15.4
New Milford	3,906	41	28	..	69	17.4	49	10	1	2	7	35	2	2	1	..	40	2	..	34	25	..	59	33	8	18	15.1
Norfolk	1,418	7	6	3	16	11.2	8	6	....	2	....	9	...	1	....	..	10	..	..	14	10	..	24	18	3	3	16.9
North Canaan	1,537	26	13	..	39	25.3	30	9	....	....	....	3	1	..	....	..	4	..	..	9	11	..	20	....	...	20	13.
Plymouth	2,351	16	14	..	30	12.8	24	3	1	2	....	8	1	..	....	..	9	..	..	10	11	..	21	17	4	...	8.9
Roxbury	950	10	6	..	16	16 8	12	2	....	1	1	4	...	..	1	.	5	..	..	4	6	..	10	10	...	...	10.5
Salisbury	3,716	56	49	..	105	28.2	63	38	1	3	....	11	5	1	1	..	18	..	..	26	33	..	59	....	...	59	15.8
Sharon	2,580	26	15	..	41	15.8	27	6	4	4	....	12	...	..	1	..	13	5	..	10	14	..	24	22	...	2	9.3
Thomaston	2,351	55	40	1	96	40.8	39	39	9	4	5	16	4	3	2	..	25	1	..	11	15	..	26	23	3	...	11.
Torrington	3,327	31	38	..	69	20.7	42	17	8	2	....	18	3	2	5	..	28	2	..	24	18	..	42	32	10	...	12.6
Warren	673	2	2	3	7	10.4	6	1	....	....	....	5	1	..	....	.	6	2	..	5	2	..	7	5	2	...	10.4
Washington	1,563	15	16	..	31	19.8	26	4	1	....	....	10	...	..	....	..	10	..	3	16	18	..	34	33	1	...	21.7
Watertown	1,897	14	17	..	31	16.3	21	5	2	3	....	12	...	..	1	..	13	..	..	12	15		27	24	1	2	14.2
Winchester	5,085	58	63	..	121	23.7	59	58	2	2	....	34	7	2	5	..	48	..	..	32	42	..	74	65	9	...	14.5
Woodbury	2,152	29	18	..	47	21.8	....	....	....	....	47	8	1	..	1	..	10	..	..	20	14	..	34	32	2	...	15.8
Total	51,139	539	463	9	1011	19.7	618	256	41	33	63	282	35	13	21	..	351	23	4	336	351	..	687	476	70	141	13.4

MIDDLESEX COUNTY.

TOWNS.	Population in 1880.	BIRTHS.										MARRIAGES.								DEATHS.							
		Sex.					Parentage.													Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Am. Mother, For. Father.	Am. Father, For. Mother.	Unknown.	Both American.	Both Foreign.	Husband Amer.	Wife American.	Unknown.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Unknown.	Total.	American.	Foreign.	Unknown.	Death-rate per 1,000.
Middletown	11,704	165	125	..	290	24.7	164	83	31	12	..	63	11	8	9	..	91	7	1	86	106	..	192	146	41	5	16.4
Haddam	2,421	31	19	..	50	20.6	36	10	2	2	..	6	2	1	1	..	10	1	..	15	12	..	27	27	..	..	11.1
Chatham	1,966	17	26	..	43	21.8	31	10	2	..	..	6	..	..	..	..	6	..	..	8	15	..	23	22	1	..	11.6
Chester	1,177	7	12	..	19	16.1	16	1	..	2	..	6	2	..	..	..	8	..	..	12	10	..	22	20	2	..	18.7
Clinton	1,412	6	12	..	18	12.7	14	3	..	1	..	7	..	..	..	..	7	1	..	18	24	..	42	32	1	9	29.7
Cromwell	1,640	14	8	..	22	13.4	6	16	..	..	..	6	1	2	..	..	9	1	..	13	7	..	20	16	4	..	12.1
Durham	990	10	7	..	17	17.1	13	4	..	..	..	6	..	..	..	..	6	..	..	8	9	..	17	15	2	..	17.1
East Haddam	3,034	21	32	..	53	17.4	48	..	2	3	..	17	1	1	..	..	19	1	..	22	20	..	42	39	3	..	13.8
Essex	1,856	20	13	..	33	17.7	29	4	..	..	..	13	..	..	1	..	14	..	..	10	18	..	28	27	1	..	15.
Killingworth	748	4	4	..	8	10.7	6	2	..	..	..	4	..	..	..	..	4	..	..	10	14	..	24	24	..	..	32.
Middlefield	928	8	4	..	12	12.9	10	2	..	..	..	1	1	..	..	..	2	..	1	6	4	..	10	9	1	..	10.7
Old Saybrook	1,305	17	15	..	32	24.4	20	8	1	3	..	7	..	..	1	..	8	..	1	8	14	..	22	20	2	..	16.8
Portland	4,162	61	39	..	100	24.0	25	71	2	2	..	15	14	..	2	..	31	1	..	41	48	..	89	67	22	..	21.3
Saybrook	1,363	8	3	..	11	8.	8	3	..	..	..	5	..	..	1	..	6	..	..	5	7	..	12	9	3	..	8.8
Westbrook	878	5	6	..	11	12.5	11	..	..	..	..	8	..	1	..	..	9	..	..	6	8	..	14	14	..	..	13.6
Totals	35,584	394	325	..	719	20.2	437	217	40	25	..	170	32	13	15	..	230	12	3	268	316	..	584	487	83	14	16.4

TOLLAND COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not Stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Unknown.	MARRIAGES. Both American.	Both Foreign.	Husband American.	Wife American.	Unknown.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Unknown.	TOTAL.	Nativity. American.	Foreign.	Unknown.	Death-rate per 1,000.
TOLLAND	1,170	19	11	..	30	25.6	22	5	1	2	....	3	...	1	...	..	4	..	..	8	15	..	23	21	2	..	19.
Andover	429	5	2	..	7	16.3	6	....	1	....	....	2	...	..	...	..	2	..	..	2	2	..	4	4	....	..	9.4
Bolton,	512	3	6	..	9	17.5	6	1	1	1	....	1	...	..	...	..	1	..	..	....	4	..	4	4	....	..	7.8
Columbia	757	7	5	..	12	15.8	10	2	....	....	....	3	...	..	...	..	3	..	..	4	7	..	11	7	3	1	14.7
Coventry	2,044	30	21	..	51	24.9	31	14	3	3	....	8	...	..	...	..	8	..	..	9	28	..	37	34	3	..	18.1
Ellington	1,568	13	12	..	25	15.9	19	3	3	....	....	7	...	..	...	..	7	1	1	10	10	..	20	18	2	..	12.7
Hebron	1,243	10	10	..	20	16.	16	3	....	1	....	6	1	..	1	..	8	1	..	9	6	..	15	14	1	..	12.
Mansfield	2,155	19	16	..	35	16.2	30	3	2	....	....	15	1	1	...	..	17	5	..	7	17	..	24	23	1	..	11.
Somers	1,242	10	10	..	20	16.1	15	2	1	2	....	3	...	..	...	..	3	1	..	9	11	..	20	19	1	..	16.1
Stafford	4,454	45	53	..	98	22.	48	37	5	7	1	30	2	2	4	2	40	8	3	17	21	11	49	42	7	..	11.
Union	539	9	6	..	15	27.8	14	....	....	1	....	3	...	1	.	..	4	..	1	3	4	..	7	6	1	..	12.9
Vernon	6,916	95	72	..	167	24.1	53	70	30	11	3	24	17	8	11	1	61	7	..	44	58	..	102	63	37	2	14.7
Wellington	1,086	12	16	..	28	25.7	22	3	2	1	....	6	...	..	1	..	7	..	..	6	18	..	24	21	3	..	22.
Total	24,115	277	240	..	517	21.4	292	143	49	29	4	111	21	13	17	3	165	23	5	128	201	11	340	276	61	3	14.

RECAPITULATION BY COUNTIES.

COUNTIES.	Population in 1880.	BIRTHS										MARRIAGES.								DEATHS.							
		Sex.					Parentage.													Sex.				Nativity.			
		Male.	Female.	Unknown.	Total.	Birth-rate per 1,000.	American.	Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Unknown.	Both American.	Both Foreign.	Am. Husband.	American Wife.	Unknown.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Unknown.	Total.	American.	Foreign.	Unknown.	Death-rate per 1,000.
Hartford....	125,406	1571	1381	7	2959	23.5	1354	1060	218	144	183	610	157	55	87	6	915	63	61	928	908	18	1854	1362	304	188	14.7
New Haven..	159,047	2091	2003	19	4113	25.8	1618	1521	383	190	401	715	215	68	130	6	1134	75	11	1201	1162	9	2372	1829	460	83	14.9
New London.	73,754	744	733	9	1486	19.8	778	548	97	61	2	387	106	34	48	..	575	49	26	619	642	8	1269	1035	220	14	17.2
Fairfield....	112,155	1115	1020	15	2150	19.1	1155	564	208	102	121	480	87	41	58	2	668	64	38	793	751	25	1569	1287	241	41	14.1
Windham...	43,813	562	528	6	1096	25.0	420	539	49	79	9	203	99	20	13	..	335	25	14	351	362	6	719	584	105	30	16.2
Litchfield....	52,011	539	463	9	1011	19.4	618	256	41	33	63	282	35	13	21	..	351	23	4	336	351	..	687	476	70	141	13.1
Middlesex...	35,586	394	325	..	719	20.2	437	217	40	25	....	170	32	13	15	..	230	12	3	268	316	..	584	487	83	14	16.4
Tolland.....	24,115	277	240	..	517	21.4	292	143	49	29	4	111	21	13	17	3	165	23	5	128	201	11	340	276	61	3	14.
Total....	625,887	7293	6693	65	14,051	22.4	6672	4848	1085	663	783	2958	752	257	389	17	4373	334	162	4624	4693	77	9394	7336	1544	514	15.

TABLE 2.

EXHIBITING THE NUMBER OF BIRTHS IN THE SEVERAL COUNTIES FOR EACH MONTH OF THE YEAR ENDING DECEMBER 31, 1879.

COUNTY.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.
	Males.....	143	124	144	119	114	128	111	157	140	138	130	123	1,571
Hartford....	Females...	159	121	119	103	121	106	108	93	117	117	105	112	1,381
	Not stated.	....	....	....	1	1	1	....	....	1	1	1	1	7
	Males.....	204	211	197	142	145	159	172	198	174	179	154	156	2,091
New Haven..	Females...	182	151	158	162	162	179	160	182	171	172	148	175	2,003
	Not stated.	1	1	2	1	1	3	1	3	3	1	1	1	19
	Males.....	71	54	56	59	56	46	55	87	85	65	65	47	744
New London.	Females...	38	40	64	62	69	65	60	63	71	62	69	70	733
	Not stated.	1	2	1	....	1	....	....	....	1	1	1	1	9
	Males.....	95	99	86	83	87	95	97	96	96	91	104	86	1,115
Fairfield.....	Females...	104	84	84	76	78	77	76	88	88	92	85	88	1,020
	Not stated.	2	2	1	1	1	4	1	....	....	3	....	....	15
	Males.....	51	52	47	43	50	49	51	43	38	42	50	46	562
Windham...	Females...	47	38	33	46	51	37	41	56	46	40	37	56	528
	Not stated.	1	1	1	....	1	....	....	1	....	....	...	1	6
	Males.....	55	38	59	45	39	54	36	59	32	49	35	38	539
Litchfield...	Females...	30	49	38	34	41	40	36	41	35	40	30	49	463
	Not stated.	....	....	3	2	....	....	....	2	1	....	1	....	9
	Males.....	36	32	26	33	36	26	38	25	44	33	35	30	394
Middlesex...	Females...	30	26	26	28	22	23	23	37	33	30	27	20	325
	Not stated.	....	....	....	....	....	....	....	....	....	....	....	....	......
	Males.....	16	19	27	20	19	16	19	23	39	20	34	25	277
Tolland.....	Females...	21	20	26	24	20	23	18	12	19	20	16	21	240
	Not stated.	....	....	....	....	....	....	....	....	....	....	....	....	......
	Males.....	671	629	642	543	546	573	579	688	648	617	607	551	7,293
Total...	Females...	611	529	548	535	564	550	522	572	580	573	517	591	6,693
	Not stated.	5	6	8	5	5	8	2	6	6	6	4	4	65
Grand Total...........		1287	1164	1198	1083	1115	1131	1103	1266	1234	1196	1128	1146	14,051

TABLE 3.

EXHIBITING THE NUMBER OF DEATHS IN THE SEVERAL COUNTIES FOR EACH MONTH OF THE YEAR ENDING DECEMBER 31, 1879.

COUNTY.	SEX.	Jauuary.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.
Hartford.....	Males.....	103	70	96	90	50	60	84	98	81	61	54	81	928
	Females...	105	70	99	72	69	69	79	87	62	95	35	65	908
	Not stated.	4	4	....	....	1	2	....	2	....	2	....	3	18
New Haven..	Males.....	104	97	111	111	85	102	129	109	83	98	86	86	1,201
	Females...	123	98	116	107	80	87	92	102	80	92	91	94	1,162
	Not stated.	1	....	....	1	....	1	1	2	....	2	1	....	9
New London.	Males.....	68	52	61	56	47	40	54	55	39	51	52	43	619
	Females...	54	55	64	53	54	42	39	69	59	41	54	58	642
	Not stated.	1	1	1	2	....	....	1	....	....	1	....	1	8
Fairfield.....	Males.....	90	63	82	66	56	49	75	78	69	56	57	52	793
	Females...	88	55	61	54	56	53	62	68	69	67	66	52	751
	Not stated.	2	5	1	1	3	1	1	3	1	....	....	7	25
Windham...	Males.....	26	25	31	34	27	22	32	32	28	30	32	32	351
	Females...	36	25	36	37	32	23	29	33	28	27	20	36	362
	Not stated.	....	....	....	....	....	...	2	....	....	....	1	3	6
Litchfield....	Males.....	27	36	42	28	30	23	19	39	25	23	22	23	336
	Females...	32	32	43	33	29	21	22	27	25	37	20	29	351
	Not stated.	....	....	....	....	....	....	....	....	....	....	....	....	......
Middlesex....	Males.....	28	21	27	24	22	17	24	24	18	22	14	27	268
	Females...	19	32	26	18	29	24	26	29	43	28	24	20	316
	Not stated.	....	....	....	....	....	....	....	....	....	....	....	....	......
Tolland.....	Males.....	10	9	8	15	14	8	11	12	8	9	8	16	128
	Females...	18	17	21	8	18	20	16	18	17	15	14	19	201
	Not stated.	....	....	....	1	1	...	3	3	3	....	....	....	11
Total.	Males.....	456	373	458	424	331	321	428	447	351	350	325	360	4,624
	Females...	475	384	466	382	367	339	365	433	383	402	324	373	4,693
	Not stated.	8	10	2	5	5	4	8	10	4	5	2	14	77
Grand Total............		939	767	926	811	703	664	801	890	738	757	651	747	9,394

TABLE 4.

CAUSES OF DEATHS ARRANGED BY TOWNS AND COUNTIES.

CLASS I.—ZYMOTIC DISEASES.

Towns in Hartford Co.	Order 1.—Miasmatic.																			
	Measles.	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittant Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.
Hartford		1	5		15	4	11	6	2	2	18	45	2		12	1	8	4	62	74
Avon	1						1				1								1	2
Berlin		10	1				1					1		1			1	1	10	6
Bloomfield							1				1	2							2	2
Bristol		1	2				1	1	1			2			3			5	8	8
Burlington																		1	1	
Canton			5	1	2		8					1			5		1		10	13
East Granby																				
East Hartford			1				3	2			1	6	1	1					10	5
East Windsor			2						1			1								4
Enfield		2			6						5	10			2			2	15	12
Farmington												2			2			1	4	1
Glastonbury		1	2					2		1		2							4	4
Granby													1							1
Hartland																				
Manchester					2		1			4	3	10			5	1	1	1	16	12
Marlborough																				
New Britain		9	6		2		1		1			10		5	4	1	1		19	21
Newington								1				1							1	1
Plainville			2						2				1							5
Rocky Hill									1		1	1							2	1
Simsbury							1				1								1	1
Southington			2			1		1				1	1	1	6				6	7
South Windsor								2	3			1							1	5
Suffield			2						1		1								1	3
West Hartford					1			1			1	1							3	1
Wethersfield					1		1				1		3		1				1	6
Windsor								2										2	3	1
Windsor Locks			1										1		1				1	2
Totals	1	24	31	1	29	5	30	18	12	7	34	97	10	8	41	3	12	17	182	198

Towns in Hartford Co.	Order 2.—Enthetic.				Order 3.—Dietic.				Total for Class 1.		
	Syphilis.	Hydrophobia.	Total. M.	Total. F.	Alcoholism.	Thrush.	Total. M.	Total. F.	Male.	Female.	Total.
Hartford	3	1	4		5	1	3	3	69	77	146
Avon									1	2	3
Berlin									10	6	16
Bloomfield									2	2	4
Bristol									8	8	16
Burlington									1		1
Canton									10	13	23
East Granby											
East Hartford									10	5	15
East Windsor										4	4
Enfield					1		1		16	12	28
Farmington									4	1	5
Glastonbury									4	4	8
Granby										1	1
Hartland											
Manchester									16	12	28
Marlborough					2		2		2		2
New Britain									19	21	40
Newington									1	1	2
Plainville										5	5
Rocky Hill									2	1	3
Simsbury									1	1	2
Southington									6	7	13
South Windsor									1	5	6
Suffield									1	3	4
West Hartford									3	1	4
Wethersfield									1	6	7
Windsor	1		1						4	1	5
Windsor Locks									1	2	3
Totals	4	1	5	...	8	1	6	3	193	201	394

Towns in Hartford County.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Messenterica.	Phthisic.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Spinal Disease.	Total. M.	Total. F.	Order 2.—Order of Cir'n. Heart Disease.	Pericarditis.	Phlebetis.	Total. M.	Total. F.	Order 3.—Respiratory System. Lung Disease.	Bronchitis.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
HARTFORD	2	16	1	7	12	..	4	123	7	77	57	84	69	153	21	11	24	..	2	26	24	4	1	52	61	35	2	1	18	20	7	19	45	..	1	41	31
Avon	1	..	..	..	1	..	..	3	..	2	1	2	2	4	..	..	..	..	..	..	..	..	..	..	..	3	..	..	3	..	..	..	..	..	..	..	..
Berlin	..	..	..	..	..	..	..	3	2	3	2	3	2	5	2	3	..	..	..	..	..	..	..	1	4	3	..	..	2	1	..	..	2	..	..	2	..
Bloomfield	..	1	..	..	1	..	..	1	..	..	1	..	2	2	3	..	..	..	..	..	..	1	..	1	3	..	1	..	..	1	..	..	1	..	..	..	1
Bristol	..	1	..	..	1	1	..	17	..	10	8	10	9	19	1	3	..	..	..	..	..	1	..	3	2	3	..	..	2	1	2	..	9	..	..	5	6
Burlington	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	2	..	..	1	1
Canton	1	2	..	1	2	..	..	6	1	4	3	5	5	10	1	1	..	..	..	1	..	1	..	3	1	4	2	..	1	5	..	1	..	..	..	1	..
East Granby	1	..	..	1	..	..	..	2	..	..	2	1	2	3	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
East Hartford	..	2	..	..	2	1	..	3	..	1	3	1	5	6	1	1	..	..	2	2	..	1	1	4	4	3	..	..	2	1	2	..	7	..	..	5	4
East Windsor	..	1	..	1	..	1	..	7	..	3	5	4	5	9	2	..	..	..	..	1	1	..	..	2	2	3	..	..	1	2	..	..	3	1	..	2	2
Enfield	3	2	..	2	3	1	..	14	3	8	10	10	13	23	3	1	..	..	..	1	..	5	..	5	5	11	..	..	6	5	4	..	9	..	..	6	7
Farmington	..	2	..	1	1	..	..	1	..	..	1	1	2	3	3	..	..	..	..	1	..	1	..	2	3	1	..	..	..	1	..	2	4	..	..	1	5
Glastonbury	..	..	..	..	..	..	1	2	..	2	1	2	1	3	1	3	..	1	..	..	..	..	..	2	3	3	..	..	2	1	..	..	2	..	..	2	..
Granby	..	1	..	..	1	..	..	4	..	2	2	2	3	5	1	1	..	..	..	..	..	1	..	2	1	1	..	..	..	1	1	..	..	..	..	..	1
Hartland	1	..	..	..	1	..	..	1	..	1	..	1	1	2	..	..	..	..	..	..	..	..	1	1	..	1	..	..	1	..	..	..	..	..	..	..	..
Manchester	3	2	..	4	1	..	..	14	..	3	11	7	12	19	3	..	1	..	1	1	..	3	..	5	4	2	..	..	..	2	..	..	7	..	..	3	4
Marlborough	..	1	..	1	..	..	..	2	..	1	1	2	1	3	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
New Britain	..	3	..	1	2	..	3	20	..	8	15	9	17	26	9	3	..	..	..	4	4	2	..	14	8	8	..	..	6	2	..	5	7	..	1	6	7
Newington	..	..	..	..	..	..	..	1	..	..	1	..	1	1	..	..	..	1	..	..	1	..	..	1	1	1	..	..	..	1	..	..	1	..	..	..	1
Plainville	..	1	..	..	1	..	..	1	..	..	1	..	2	2	1	..	..	..	..	2	1	..	..	2	2	1	..	..	..	1	..	..	1	..	..	1	..
Rocky Hill	..	..	..	..	..	..	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	1	..	..	1	3	..	..	1	2	..	..	1	..	..	..	1
Simsbury	3	1	..	3	1	..	..	..	..	..	..	3	1	4	3	1	..	1	..	..	..	1	..	3	3	1	..	..	1	..	..	..	3	..	1	2	2
Southington	1	1	..	2	..	1	..	9	1	4	7	6	7	13	3	3	..	1	..	..	2	4	..	6	7	3	1	..	2	2	..	3	7	..	..	5	5
South Windsor	..	..	..	..	..	..	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	2	1
Suffield	..	..	1	1	..	..	..	..	1	1	..	2	..	4	3	1	1	1	..	..	..	2	..	4	4	1	..	..	1	..	5	..	1	..	..	1	5
West Hartford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	3	..	..	..	4	2	1	..	..	.	1	..	..	2	..	..	1	1
Wethersfield	..	.	1	1	..	..	3	8	..	9	2	10	2	12	1	1	..	..	..	..	..	4	..	3	3	..	2	..	2	..	..	..	2	..	..	..	2
Windsor	3	2	..	2	3	..	..	10	..	4	6	6	9	15	1	3	..	..	..	..	..	..	1	3	2	6	..	..	2	4	2	..	1	1	..	2	2
Windsor Locks	..	.	..	..	.	..	1	1	..	2	..	2	..	2	.	..	..	.	..	..	1	2	..	3	..	1	..	..	1	..	..	..	3	..	..	2	1
Totals	19	39	3	28	33	5	12	255	15	147	140	175	173	348	68	36	26	5	5	42	35	34	4	129	126	99	8	1	54	54	23	30	123	2	3	91	90

CLASS III.—LOCAL DISEASE—CONCLUDED.

Towns in Hartford County.	Order 4.—Digestive Organs.															Order 5.—Urinary Organs.								Order 6.—Generative Organs.			Order 8.—Integumentary System.				Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Hernia.	Stricture of Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Total. M.	Total. F.	Bright's Desease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Uraemia.	Total. M.	Total. F.	Ovarian Dropsy.	Disease of Uterus.	Total.	Phlegmon.	Disease. of Skin.	Total. M.	Total. F.	Males.	Females.	Total.
Hartford	..	4	10	..	1	3	....	6	..	1	..	10	1	18	18	16	1	..	..	5	..	12	11	....	....	..	1	1	1	1	142	142	284
Avon	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	....	....	..	..	....	..	..	3	1	4
Berlin	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	....	....	..	..	....	..	..	6	5	11
Bloomfield	..	..	..	..	....	..	....	..	..	1	1	..	..	..	2	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	1	7	8
Bristol	1	..	..	1	....	..	....	..	..	..	..	..	..	1	1	..	..	..	1	2	1	2	2	....	....	..	..	....	..	..	13	12	25
Burlington	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	....	....	..	..	....	..	..	4	1	5
Canton	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	5	6	11
East Granby	..	..	..	..	....	..	....	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	2	...	2
East Hartford	1	..	..	..	....	1	....	..	..	..	..	..	..	1	1	2	..	..	..	..	..	1	1	...	1	1	..	....	..	..	13	12	25
East Windsor	1	..	1	..	....	..	....	..	..	..	..	..	..	1	1	..	..	..	..	1	..	..	1	....	....	..	..	....	..	..	6	8	14
Enfield	..	2	..	..	1	..	....	..	..	..	..	1	..	1	3	2	1	..	..	2	..	5	..	....	....	..	..	....	..	..	23	20	43
Farmington	..	..	1	..	....	..	....	..	..	1	..	..	..	1	1	1	1	..	..	..	..	1	1	....	1	1	1	....	..	..	5	12	17
Glastonbury	..	..	1	..	....	..	....	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	7	4	11
Granby	..	..	..	..	....	..	....	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	2	4	6
Hartland	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	2	...	2
Manchester	..	1	..	..	1	..	1	..	1	..	..	1	..	3	2	1	1	..	..	..	..	2	..	....	....	..	..	....	..	..	13	12	25
Marlborough	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	1	...	1
New Britain	1	4	3	..	....	..	....	1	..	..	..	..	..	7	2	3	..	..	..	..	..	1	2	1	....	1	1	....	..	1	34	23	57
Newington	..	..	..	..	....	..	....	..	..	..	..	2	..	1	1	..	..	1	..	..	..	1	..	....	....	..	..	....	..	..	3	4	7
Plainville	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	....	....	..	..	....	..	..	3	4	7
Rocky Hill	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	....	....	..	..	....	..	..	1	5	6
Simsbury	..	1	..	..	....	..	....	1	..	..	..	1	..	2	1	..	..	1	..	..	..	1	..	1	....	1	..	....	..	..	9	7	16
Southington	..	..	4	..	....	..	....	..	..	..	..	..	..	3	1	..	1	..	..	..	1	1	1	....	....	..	..	....	..	..	18	15	33
South Windsor	1	..	..	..	....	..	....	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	2	2	4
Suffield	1	..	..	..	....	..	....	..	..	..	..	..	..	..	1	..	1	..	..	1	..	2	..	....	1	1	..	....	..	..	8	11	19
West Hartford	..	..	..	..	....	..	....	..	..	..	..	..	..	..	..	2	..	..	..	..	..	2	..	....	....	..	..	....	..	..	7	4	11
Wethersfield	..	2	1	..	....	..	....	..	..	..	..	1	..	2	2	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	7	7	14
Windsor	..	2	1	..	1	..	....	1	..	..	..	1	..	2	4	1	..	..	1	1	..	2	1	....	....	..	..	....	..	..	11	13	24
Windsor Locks	..	..	..	..	....	..	....	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	....	....	..	..	....	..	..	6	2	8
Total	6	16	22	1	4	4	1	9	1	3	3	18	1	45	44	29	7	2	5	13	2	37	22	2	3	5	2	1	1	2	357	343	700

Towns in Hartford Co.	Class IV.—Developmental Diseases. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Total for Class IV. Female.	Total for Class IV. Total.
Hartford	16	29		2	1		38	10	6	10	10	4	2	56	24	80
Avon		1						1		1	1			1	2	3
Berlin	1	1					1	1			2		1	1	4	5
Bloomfield										1				1		1
Bristol						1		1		1	5			1	6	7
Burlington											2				2	2
Canton	3							3			1				4	4
East Granby											1				1	1
East Hartford										2	4			2	4	6
East Windsor		3					1	2		2	1		1	3	4	7
Enfield			1					1	1	5	2			5	4	9
Farmington		1						1							1	1
Glastonbury		2						2	1	2	2			2	5	7
Granby	1							1	1						2	2
Hartland											1				1	1
Manchester		1	1			1	1	2	1	1	2			2	5	7
Marlborough										1	2			1	2	3
New Britain	10	5					7	8	2	3	4			10	14	24
Newington		2					2				2			2	2	4
Plainville																
Rocky Hill										1	1			1	1	2
Simsbury	3						3			1		1	1	5	1	6
Southington		2				3	2	3	2	1	2	2		5	7	12
South Windsor		1					1			1	1			2	1	3
Suffield	1	1					1	1		1	3			2	4	6
West Hartford																
Wethersfield		1					1			2	3			3	3	6
Windsor										1	2			2	1	3
Windsor Locks					1			1	1						2	2
Totals	35	50	2	2	2	5	58	38	15	37	4	7	5	107	107	214

Towns in Hartford Co.	Class V.—Violent Deaths. Order 1.—Accident and Negligence. Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Order IV. Suicide. M.	Order IV. Suicide. F.	Violent.	Sudden.	Total. M.	Total. F.	Cause not reported. M.	Cause not reported. F.	Total for Class V. Male.	Total for Class V. Female.	Total for Class V. Total.
Hartford	1	5	2		7		13	20	8		2						8	2	26	14	40
Avon		1						1											1		1
Berlin	2							2									1	3	3	3	6
Bloomfield																					
Bristol					1			1				1					2		3	1	4
Burlington	1			1				2									1		3		3
Canton	1				1		1	3											3		3
East Granby																					
East Hartford				1			1		2					1	1		9	5	10	7	17
East Windsor	2				1		1	2	2								1		3	2	5
Enfield	1				1			2		1				1	1			12	4	12	16
Farmington	1		1						2			1					3	3	3	6	9
Glastonbury																					
Granby	1						1	1	1										1	1	2
Hartland																					
Manchester	2		1			1		1	3		2		1	1	1	1	4	1	8	5	13
Marlborough							1	1											1		1
New Britain	3	1	1					4	1								10	8	14	9	23
Newington																	1		1		1
Plainville																					
Rocky Hill																					
Simsbury	2					2	3	2	5		1								3	5	8
Southington	1				1			2			1						1	1	4	1	5
South Windsor	1								1								1	1		2	2
Suffield	2						1	2	1		1							4	3	5	8
West Hartford					1		1	2									2	1	4	1	5
Wethersfield											1					1		1	1	2	3
Windsor	3		1					1	3								1	1	2	4	6
Windsor Locks														1							
Totals	24	7	6	2	13	3	23	49	29	1	8	2	1	4	3	2	45	43	101	85	181

Towns in Hartford Co.	Grand Total for All Classes. Males.	Females.	Sex not Stated.	Total.
Hartford	376	326	11	713
Avon	8	7		15
Berlin	23	20		43
Bloomfield	4	11		15
Bristol	35	36		71
Burlington	8	3		11
Canton	23	28		51
East Granby	3	3		6
East Hartford	36	33	1	70
East Windsor	16	23		39
Enfield	58	61		119
Farmington	13	22		35
Glastonbury	15	14		29
Granby	5	11		16
Hartland	3	2		5
Manchester	46	45		91
Marlborough	7	3		10
New Britain	81	89	5	175
Newington	7	8		15
Plainville	3	11		14
Rocky Hill	6	6		12
Simsbury	21	15		36
Southington	38	38		76
South Windsor	7	10		17
Suffield	16	23		39
West Hartford	14	6		20
Wethersfield	22	20		42
Windsor	25	28		53
Windsor Locks	9	6	1	16
Totals	928	908	18	1854

TABLE.

CAUSES OF DEATH ARRANGED BY TOWNS.

Towns in New Haven Co.	Class I.—Zymotic Diseases.																																			Total for Class III.		
	Order I.—Miasmatic.																								Order II.—Enthetic.					Order III.—Dietic.								
	Measles.	Small-pox.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Influenza.	Carbuncle.	Pyaemia.	Septicaemia.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittant Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Fever.	Total. M.	Total. F.	Syphilis.	Hydrophobia.	Stricture.	Total. M.	Total. F.	Privation.	Purpura.	Alchoholism.	Worms.	Total. M.	Total. F.	Male.	Female.	Total.
New Haven	6		3	28	19	15	12	6	4		1			3	15	35	3		20	3	3	2	96	82	1				1		1	3		1	3	97	86	183
Beacon Falls			1		1																	1	2	1												2	1	3
Bethany																																						
Branford																			1	2		1	3	1												3	1	4
Cheshire																1			3				1	3												1	3	4
Derby		1	2	1		2	1							1		8	1						10	7												10	7	17
East Haven									1						1					1			1	2												1	2	3
Guilford							1					1	1					1	1				1	4												1	4	5
Hamden				5													1						1	5								1		1		2	5	7
Madison																																1		1		1		1
Meriden	1		15	27	14	3	5	1	3	1				1	4	20	1		4	2			50	52								1		1		51	52	103
Middlebury				1			1							1									2	1												2	1	3
Milford				1												4							1	4												1	4	5
Naugatuck				1	2									2									2	3												2	3	5
North Branford				2	1														1					4													4	4
North Haven																	1	1					1	1												1	1	2
Orange							3					1		1	1	2							7	1												7	1	8
Oxford																	1		1		1		1	2								1		1		2	2	4
Prospect																																						
Seymour				1												4							5													5		5
Southbury							1									1					1		2	1												2	1	3
Wallingford								2	2					1	1	2			5			2	6	9												6	9	15
Waterbury			6	6	1			1	1		1				1	12			5	1	3	4	22	20								3	1	3	1	25	21	46
Wolcott								1																1													1	1
Woodbridge																																						
Total	7	1	27	73	38	20	24	11	11	1	2	2	1	10	23	89	8	2	41	9	8	10	214	204	1				1		1	10	1	8	4	222	209	431

Towns in New Haven Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic: Dropsy & Anemia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tuberculous: Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II.: Male.	Female.	Total.
New Haven	5	24		12	17	1	23	161	11	103	93	115	110	225
Beacon Falls														
Bethany	1				1								1	1
Branford	2	1	1	1	3			9		6	3	7	6	13
Cheshire		1			1	1		2		2	1	2	2	4
Derby	2	1		1	2			18	2	8	12	9	14	23
East Haven		2		1	1		3	1		3	1	4	2	6
Guilford	1	3		1	3			4		3	1	4	4	8
Hamden		1			1	1		2	1	1	3	1	4	5
Madison		1			1			6		4	2	4	3	7
Meriden	2	4		3	3		4	34		17	21	20	24	44
Middlebury			1					2		2		2		2
Milford	1				1		1	3		1	3	1	4	5
Naugatuck								7		3	4	3	4	7
No. Branford		2			2								2	2
North Haven		2		1	1			5		3	2	4	3	7
Orange		2			2		1	5		3	3	3	5	8
Oxford								4		2	2	2	2	4
Prospect	1				1			3		1	2	1	3	4
Seymour	2	1		2	1			3		2	1	4	2	6
Southbury						1		2		1	2	1	2	3
Wallingford		2			2		1	4	1	2	3	2	5	7
Waterbury	3	2		1	4	1		49	6	27	29	28	33	61
Wolcott		1			1			3		1	2	1	3	4
Woodbridge,								3		2	1	2	1	3
Totals	20	50	2	23	48	5	32	330	21	197	191	220	239	459

Towns in New Haven Co.	CLASS III—LOCAL DISEASES. Order I.—Nervous System: Apoplexia.	Paralysis.	Insanity.	Chorea.	Epilepsy.	Tetanus.	Convulsions.	Brain Disease.	Spinal Disease.	Meningitis.	Total. M.	Total. F.	Order II.—Circulation: Pericarditis.	Aneurism.	Heart Disease.	Total. M.	Total. F.	Order III.—Respiratory System: Laryngitis.	Asthma.	Bronchitis.	Pneumonia.	Pleurisy.	Lung Disease.	Total. M.	Total. F.
New Haven	24	18	2		1	8	52	23		26	86	68	3		49	24	28	5		36	73	3	7	72	52
Beacon Falls	1									1		2													
Bethany		1									1										2			2	
Branford		4	1					2		2	4	5			1		1				4		1	3	2
Cheshire	1	4								1	3	3			2	1	1			2	4			2	4
Derby	5	2					9	1		2	6	13		1	5	5	1	3		3	14		6	14	12
East Haven							2	1		2	3	2			2	1	1			2	1			1	2
Guilford		5								1	4	2	1		1	2			1		2		1	2	2
Hamden		1			1						1	1			2	1	1				5			3	2
Madison	1	2								2	1	4			3	2	1				2				2
Meriden	2	5	1				13	7	2	5	16	19			6	4	2		1	3	16		7	16	11
Middlebury		1										1			1		1				1			1	
Milford	1	4		1		2	1	1			5	5	1			1					5		10	4	11
Naugatuck	3	1					2				3	3			1		1				8	1		4	5
No. Branford	1	2										3			1	1					4		1	3	2
North Haven	2	1					1				1	5			1	1					3			2	1
Orange	2							1			2	1								1	3		1	2	3
Oxford								1				1		1	2	1	2								
Prospect																							2	1	1
Seymour	2					1	1	1			2	3			1		1				4			3	1
Southbury															2	2							1		1
Wallingford	1	3					2	2		1	5	4								1	3		3	4	3
Waterbury	4	4					16	6		4	19	15			10	3	7	1	3		15	1	2	15	7
Wolcott															1	1									
Woodbridge,		1						2			3				2	1	1								
Totals	51	59	4	1	2	11	99	48	2	47	165	158	5	2	9	51	49	9	5	48	169	5	42	154	124

CLASS III.—LOCAL DISEASES—Concluded.

Towns in New Haven Co.	Order 4.—Digestive Organs. Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Hernia.	Intussusception.	Stricture.	Stomach Disease.	Hepatitis.	Jaundice.	Liver Disease.	Addisons Disease.	Spleen Disease.	Total. M.	Total. F.
New Haven	10	13	14	1	2	1	..	..	1	5	2	5	..	3	27	30
Beacon Falls																
Bethany																
Branford			2				1								1	2
Cheshire					1				2		1				1	3
Derby	2	3			1			1		1		1			2	7
East Haven																
Guilford																
Hamden			1												1	
Madison													1		1	
Meriden	2	3	4			1					1	3			4	10
Middlebury																
Milford	1		1									2			1	3
Naugatuck			1							1					1	1
North Branford																
North Haven																
Orange		2													1	1
Oxford	1			1						1	1				2	2
Prospect																
Seymour						1						1			2	
Southbury								1								1
Wallingford						1			1						1	1
Waterbury	3		15						2			3			7	16
Wolcott	1															1
Woodbridge	1															1
Totals	21	21	38	2	4	4	1	2	6	8	5	15	1	3	52	79

Towns in New Haven Co.	Order 5.—Urinary Organs. Nephritis.	Bright's Disease.	Diabetes.	Cystitis.	Kidney Disease.	Prostatitis.	Uræmia.	Total. M.	Total. F.	Order 6.—Gen'ative Organs. Ovarian Dropsy.	Disease of Uterus.	Total. F.	Order 7.—Organs of Locomotion. Necrosis and Caries.	Joint Disease.	Total. M.	Total. F.	Order 8.—Integumentary System. Tumor.	Phlegmon.	Ulcer.	Skin Disease.	Total. M.	Total. F.	Total for Class III. Males.	Females.	Total.
New Haven	5	15	2	6	2	..	9	30	9	2	5	7	....	2	....	2	..	..	4	1	2	3	241	199	440
Beacon Falls																							....	2	2
Bethany																							3	....	3
Branford	1							1					1		1								10	11	21
Cheshire			1	1				2			1	1		1		1							9	12	21
Derby		2						2										2				2	29	35	64
East Haven																							5	5	10
Guilford							2	2						1	1								11	4	15
Hamden																							6	4	10
Madison										1		1	1			1							4	9	13
Meriden		1		1				1	1								1			1	1	1	42	44	86
Middlebury																							1	2	3
Milford				1				1															12	19	31
Naugatuck			1	1				1	1		1	1											11	10	21
North Branford		1						1															5	4	9
North Haven																							4	4	8
Orange		1						1															6	5	11
Oxford		1	1			1		2	1														5	6	11
Prospect			1					1															....	1	1
Seymour			1		1				2														7	7	14
Southbury							1	1			2	2											3	4	7
Wallingford					1			1															11	8	19
Waterbury		1						1			2	2		4	2	2		1				1	47	50	97
Wolcott																							2	....	2
Woodbridge																							4	2	6
Totals	6	22	7	10	4	1	12	48	14	3	11	14	2	8	4	6	1	3	4	2	3	7	478	447	925

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in New Haven Co.	Order 1.—of Children. Stillborn.	Premature Birth and Debility.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Order 2.—of Women. Childbirth.	Order 3.—of Old People. Old Age. M.	Old Age. F.	Order 4.—of Nutrition. Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Males.	Females.	Total.
New Haven	58	25	..	2	6	9	45	55	4	9	23	12	11	66	93	159
Beacon Falls	1	..	..	..	..	..	..	1	..	..	..	..	..	..	1	1
Bethany	..	..	..	..	..	..	..	..	..	1	1	..	1	1	2	3
Branford	..	5	..	..	..	..	1	4	..	2	3	..	..	3	7	10
Cheshire	..	1	..	..	..	..	1	..	1	..	2	..	1	1	4	5
Derby	6	13	..	1	1	..	12	9	..	3	2	..	1	15	12	27
East Haven	..	1	..	..	..	..	..	1	..	1	..	..	1	1	2	3
Guilford	..	..	..	..	..	..	..	..	..	4	..	..	..	4	..	4
Hamden	..	1	..	..	..	..	1	..	..	2	2	..	..	3	3	6
Madison	1	..	..	..	..	..	..	1	..	1	2	..	1	1	4	5
Meriden	8	19	..	..	1	2	20	10	3	..	6	2	3	22	22	44
Middlebury	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	2
Milford	..	3	..	..	..	..	1	2	..	..	1	..	..	1	3	4
Naugatuck	8	..	..	..	..	..	7	1	..	1	1	1	..	9	2	11
North Branford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
North Haven	..	..	..	..	..	..	..	..	..	1	1	..	..	1	1	2
Orange	3	2	..	..	..	..	4	1	..	1	1	..	..	5	2	7
Oxford	1	2	1	1	..	..	3	2	..	1	1	..	..	4	3	7
Prospect	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1
Seymour	3	..	..	1	..	..	3	1	1	2	..	..	..	5	2	7
Southbury	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wallingford	4	3	..	..	..	5	2	..	..	3	4	2	..	10	6	16
Waterbury	32	3	..	..	5	1	19	22	3	5	6	4	5	28	36	64
Wolcott	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Woodbridge	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1
Totals	125	78	1	5	13	17	119	110	12	39	56	23	24	184	205	389

CLASS V.—VIOLENT DEATHS.

Towns in New Haven Co.	Order 1.—Accident and Negligence. Fracture Contusion.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent, not Classed Casualty. M.	Violent, not Classed Casualty. F.	Sudden. M.	Sudden. F.	Cause not Reported. M.	Cause not Reported. F.	Total. M.	Total. F.	Total for Class V. Males.	Females.	Total.	Grand Total. Males	Females.	Total.	Sex not stated.
New Haven	16	1	4	3	10	3	..	31	6	1	4	2	..	..	..	..	3	8	39	16	39	16	55	558	504	1062	..
Beacon Falls	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	2	..	2	..	2	4	4	8	..
Bethany	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	1	1	2	1	2	3	5	5	10	..
Branford	1	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	1	2	1	2	1	3	25	25	51	1
Cheshire	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	..	1	1	13	23	36	..
Derby	2	..	1	..	..	1	1	4	1	..	4	..	..	..	..	..	3	1	11	2	11	2	13	74	70	146	2
East Haven	..	..	..	..	..	..	3	3	..	1	..	..	..	..	..	..	..	..	4	..	4	..	4	15	11	26	..
Guilford	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	21	12	33	..
Hamden	1	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	2	..	2	..	2	14	16	20	..
Madison	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	11	16	27	..
Meriden	1	..	2	..	..	..	..	3	..	..	..	1	..	..	3	1	3	11	9	10	9	10	19	143	153	297	1
Middlebury	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	3	10	.
Milford	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	8	2	8	3	8	3	11	23	33	56	..
Naugatuck	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	..	..	..	2	1	2	1	3	25	22	47	..
North Branford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	5	12	17	..
North Haven	..	..	..	1	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	2	2	10	11	21	..
Orange	2	..	..	..	1	..	1	2	2	..	..	..	..	..	..	..	1	1	1	1	3	3	6	22	18	40	..
Oxford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	13	14	27	..
Prospect	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	2	1	2	3	5	7	12	..
Seymour	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	21	11	32	..
Southbury	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	11	..	1	..	2	2	7	8	15	..
Wallingford	1	..	..	..	1	..	1	2	..	..	1	..	..	..	..	..	1	..	2	..	4	..	4	33	28	61	..
Waterbury	..	..	2	..	..	1	3	5	2	..	..	..	..	..	1	1	4	6	5	7	10	9	19	137	149	291	5
Wolcott	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	4	7	..
Woodbridge	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	8	3	11	..
Totals	27	3	9	4	15	6	11	58	17	2	13	3	..	1	4	2	24	36	90	48	101	56	157	1201	1162	2372	9

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

Towns in New London Co.	CLASS I.—ZYMOTIC DISEASES.																																				
	Order I.—Miasmatic.																						Order II.—Enthetic.						Order III.—Dietic.					Total for Class I.		
	Small-pox.	Chicken Pox.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittent Fever.	Remittent Fever.	Typho-Malarial Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Pyaemia.	Congestive Fever.	Measles.	Total. M.	Total. F.	Syphilis.	Strict're of Urethra.	Hydrophobia.	Total. M.	Total. F.	Alcholism.	Thrush.	Worms.	Purpurea.	Total. M.	Total. F.	Male.	Female.	Total.
New London	3		23	5	5	3	4				3	2	11					1				29	31	1	1		1	1	1					1	30	33	63
Norwich		1	3	3	4	14	5		2		4	3	15		1	1	3	1				31	29							1			1		32	29	61
Bozrah							1											1				2													2		2
Colchester				2			2		1							1						3	3												3	3	6
East Lyme						1	3						2									1	5												1	5	6
Franklin																																					
Griswold				10									1				1					2	10												2	10	12
Groton						4	5			1												6	4												6	4	10
Lebanon																	1					1													1		1
Ledyard													1				1					1	1												1	1	2
Lisbon				1																		1													1		1
Lyme																																					
Montville						1	1				1	1										2	2												2	2	4
No. Stonington				10	1																	4	7												4	7	11
Old Lyme				1							1	1										2	1						1				1		3	1	4
Preston			3			1	1										1					2	4												2	4	6
Salem							1																1													1	1
Sprague					1		6		2				3					4				7	9												7	9	16
Stonington			2	8	2		5	1	1				4	1								9	17	1			1								10	17	27
Waterford						1							1									1	1							1				1	1	2	3
Totals	3	1	31	40	13	25	34	1	6	1	9	7	38	1	1	2	7	7	..	....	..	104	125	2	1	..	2	1	2	2	..	.	2	2	108	128	236

CLASS II.—CONSTITUTIONAL DISEASES.

Towns in N. London Co.	Order I.—Diathetic. Dropsy and Anaemia.	Cancer.	Mortification.	Total. M.	Total. F.	Scrofula.	Order 2.—Tubercular. Tabes Mesenterica.	Hydrocephalus.	Phthisis.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
New London	6	5	..	3	8	1	....	3	36	18	22	21	30	51
Norwich	3	9	..	5	7	2	1	7	55	27	38	32	45	77
Bozrah	....	..	..	....	...	..	....	..	....	....	....	....	....	....
Colchester	1	2	..	1	2	..	....	..	8	3	5	4	7	11
East Lyme	2	2	1	3	2	..	....	..	4	1	3	4	5	9
Franklin	....	..	..	....	....	..	....	..	....	....	....	....	....	....
Griswold	....	1	..	....	....	1	....	..	6	3	3	3	4	7
Groton	2	2	..	3	1	..	....	..	11	2	9	5	10	15
Lebanon	...	1	1	1	1	..	....	..	4	....	4	1	5	6
Ledyard	2	3	..	4	1	..	....	..	5	3	2	7	3	10
Lisbon	....	..	..	....	....	..	....	..	....	....	....	....	....	....
Lyme	...	..	..	....	....	..	....	..	....	....	....	....	...	....
Montville	...	..	..	....	....	..	2	..	4	2	4	2	4	6
N. Stonington	1	.	..	....	1	..	....	..	5	2	3	2	4	6
Old Lyme	...	..	..	....	....	..	....	..	2	....	2	....	2	2
Preston	2	1	..	1	2	..	....	1	7	1	7	2	9	11
Salem	...	..	..	...	....	..	....	1	4	2	3	2	3	5
Sprague	1	..	..	....	1	1	....	1	10	6	6	6	7	13
Stonington	3	2	..	3	2	..	....	..	9	4	5	7	7	14
Waterford	1	1	..	...	2	..	....	..	2	2	....	2	2	4
Totals	24	29	2	24	31	4	3	13	172	76	116	100	147	247

CLASS III.—LOCAL DISEASES.

Towns in N. London Co.	Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Brain Disease.	Meningitis.	Total. M.	Total. F.	Order 2.—Organs of Circulation. Pericarditis.	Aneurism.	Heart Disease.	Embolism.	Total. M.	Total. F.	Order 3.—Respiratory System. Laryngitis.	Bronchitis.	Pleurisy.	Pneumonia.	Asthma.	Lung Disease.	Total. M.	Total. F.
New London	1	14	2	3	..	2	11	..	17	16	..	1	17	..	11	7	1	6	..	5	..	2	7	7
Norwich	12	7	2	4	..	17	8	7	27	30	5	3	8	..	6	10	..	5	1	26	..	1	13	20
Bozrah	3	..	..	..	..	..	..	..	2	1	..	..	1	..	1	....	..	..	..	2	1	..	2	1
Colchester	..	..	..	..	..	..	1	1	1	1	..	..	4	1	1	4	..	2	..	3	..	..	1	4
East Lyme	..	..	..	..	1	1	1	..	1	2	..	..	..	..	....	....	..	..	..	4	..	1	2	3
Franklin	..	1	..	..	..	1	..	..	1	1	..	..	..	..	....	....	..	..	..	1	..	..	1	....
Griswold	..	3	..	..	..	..	..	1	2	2	..	..	..	..	....	....	..	1	..	2	..	..	3	....
Groton	1	6	1	..	..	9	7	..	17	7	..	..	4		3	1	..	..	..	6	..	..	2	4
Lebanon	1	..	..	..	..	3	..	..	1	3	..	..	1	.	1	....	..	..	..	..	..	1	1	....
Ledyard	..	3	..	..	1	..	..	2	4	2	..	..	..	..	....	....	..	1	..	2	..	..	1	2
Lisbon	..	3	..	..	..	..	..	..	1	2	..	..	..	..	....	....	..	1	.	1	..	..	1	1
Lyme	1	..	..	..	..	..	1	..	1	1	..	..	..	..	...	...	..	..	..	..	..	..	....	....
Montville	1	1	..	.	..	..	1	..	1	2	..	..	4	..	3	1	..	..	..	1	..	1	1	1
N. Stonington	1	1	..	..	..	..	1	..	1	2	..	..	2	..	2	..	..	..	..	4	..	..	1	3
Old Lyme	..	..	..	..	..	3	1	..	3	1	..	1	1	..	....	2	..	1	..	..	..	..	....	1
Preston	..	1	..	..	..	..	2	..	....	3	..	..	1	..	1	....	..	..	..	..	..	1	1	....
Salem	1	..	1	..	..	..	..	..	1	1	2	..	4	..	3	3	..	..	..	1	..	..	1	....
Sprague	1	1	..	..	..	1	1	..	2	2	..	..	..	..	..	....	1	..	..	1	..	..	1	1
Stonington	6	2	..	1	1	2	2	..	11	3	..	1	4	1	2	4	..	1	..	7	..	..	2	6
Waterford	1	2	1	..	..	1	1	1	5	2	..	..	1	..	1	....	..	..	..	2	..	..	1	1
Totals	30	45	7	8	3	40	38	12	99	84	7	6	53	2	35	32	2	18	1	68	1	7	42	55

CLASS III.—LOCAL DISEASES—Concluded.

Towns in New London County.	Order 4.—Digestive Organs.													Order 5.—Urinary Organs.								Order 6.—Generative Organs.			Disease of Joints.		Order 8.—Integumen'ry		Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ascistes.	Hernia.	Stricture of Intestine.	Stomach Disease.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Total.		Bright's Disease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Uræmia.	Total.		Ovarian Dropsy.	Disease of Uterus.	Total.	Joint Disease.		Ulcer.		Males.	Females	Total.
												M.	F.							M.	F.				M.	F.	M.	F.			
New London	6	1	1		3		1	1		5	1	6	13		1		1	2		3	1		2	2	1				45	46	91
Norwich	4	2	3		1		3	1	1	3		10	8		1	1	1	1		3	1				1	1			60	70	130
Bozrah																	1			1									6	2	8
Colchester			1									1		2	1			2		3	2								7	11	18
East Lyme				1									1	3						3									6	6	12
Franklin														1			1			2									4	1	5
Griswold						1							1																5	3	8
Groton							1					1		1		2				2	1					1			25	14	39
Lebanon	1												1																3	4	7
Ledyard														1				1		1	1	1		1					6	6	12
Lisbon																													2	3	5
Lyme										1		1										1		1					2	2	4
Montville														2				1		2	1								7	5	12
No. Stonington	1								1			1	1			1				1									6	6	12
Old Lyme										1			1																3	5	8
Preston								1				1																	3	3	6
Salem															1					1									6	4	10
Sprague	1		1		1			1				1	3									1		1			1	1	5	8	13
Stonington										1		1						3	1	3	1								19	14	33
Waterford										1			1														1		8	4	12
Totals	13	3	6	1	5	1	5	4	2	12	1	23	30	10	4	4	4	10	1	25	8	3	2	5	2	2	2	1	228	217	445

Towns in New London Co.	CLASS IV.—DEVELOPMENTAL DISEASES. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Total.	CLASS V.—VIOLENT DEATHS. Order 1.—Accident and Negligence. Wounds.	Poison.	Drowning.	Otherwise.	Fractures.	Burns and Scalds.	Total. M.	Total. F.	Order 3.—Suicidal. M.	Order 3.—Suicidal. F.	Orders 4 and 5. Sudden.	Cause not reported.	Total. M.	Total. F.	Total for Class V. Male.	Female.	Total.	Grand Total for All Classes. Males.	Females.	Sex not Stated.	Total.
New London..	8	1	..	..	..	2	9	2	..	8	9	1	5	18	16	34	..	..	4	..	1	..	5	...	1	...	..	....	...	...	6	..	6	120	125	6	251
Norwich.......	24	..	..	1	3	2	15	15	..	11	13	8	7	34	35	69	..	..	1	3	1	2	5	2	2	1	..	31	23	18	23	18	41	181	197	....	378
Bozrah........	..	..	..	..	..	..	...	...	..	...	1	...	...	...	1	1	..	..	..	..	2	..	2	...	...	...	..	2	...	2	2	2	4	10	5	....	15
Colchester.....	..	..	..	..	..	..	...	...	..	1	1	...	...	1	1	2	..	..	..	..	..	2	...	2	...	...	..	5	5	...	5	2	7	20	24	....	44
East Lyme.....	..	..	2	..	..	..	1	1	..	1	2	...	...	2	3	5	..	..	3	..	..	..	2	1	...	...	1	5	6	..	8	1	9	21	20	1	42
Franklin.......	..	1	..	..	..	..	1	...	..	1	1	..	...	2	1	3	..	..	..	..	1	..	1	...	...	...	..	....	...	...	1	..	1	7	2	....	9
Griswold......	..	..	..	..	..	..	...	...	..	1	...	...	...	1	...	1	1	1	..	1	..	..	1	2	...	..	..	....	...	...	1	2	3	12	19	....	31
Groton.........	3	..	..	..	..	..	...	3	1	2	8	...	1	2	13	15	..	..	1	..	..	..	1	...	...	...	..	3	3	...	4	..	4	43	41	....	84
Lebanon.......	..	..	..	..	..	..	...	...	..	3	1	...	...	3	1	4	..	..	1	..	1	..	2	...	...	..	..	4	1	3	3	3	6	11	13	....	24
Ledyard.......	..	..	..	..	..	..	...	...	..	...	2	...	...	...	2	2	..	..	..	..	..	..	...	...	1	...	..	1	1	...	2	..	2	16	12	....	28
Lisbon........	..	..	..	..	..	..	...	...	..	...	...	...	...	...	...	...	1	..	..	..	..	..	1	...	...	...	..	1	1	...	2	..	2	5	3	....	8
Lyme.........	..	4	..	..	..	..	2	2	..	...	...	2	1	4	3	7	..	..	..	..	..	..	...	...	...	...	..	....	...	...	...	..	...	6	5	1	12
Montville.....	..	..	..	..	..	..	...	...	..	3	3	...	1	3	4	7	..	..	..	2	..	..	...	2	...	...	..	4	2	2	2	4	6	16	19	....	35
No. Stonington	2	..	..	..	1	..	1	2	..	...	...	...	1	1	3	4	..	..	2	..	..	..	2	...	...	...	..	....	...	...	2	..	2	15	20	....	35
Old Lyme.....	..	..	..	..	..	..	...	...	..	1	3	...	...	1	3	4	..	..	..	..	..	..	...	...	...	...	..	1	1	...	2	3	5	8	11	....	19
Preston.......	..	2	..	..	..	..	1	1	..	...	3	...	...	1	4	5	..	..	..	..	..	..	...	...	...	...	..	6	4	2	4	2	6	12	22	....	34
Salem........	..	..	..	..	..	..	...	...	..	2	3	...	...	2	3	5	..	..	..	..	..	..	...	...	...	...	..	....	...	...	...	..	...	10	11	....	21
Sprague......	5	5	..	..	..	..	10	...	1	1	1	...	...	11	2	13	..	..	..	..	..	..	...	...	...	...	..	....	...	...	...	..	...	29	26	....	55
Stonington....	2	1	..	..	..	..	2	1	1	...	7	...	...	2	9	11	2	..	..	..	3	..	5	...	...	...	..	31	19	12	24	12	36	62	59	....	121
Waterford.....	..	..	..	..	..	..	...	...	..	1	...	...	...	1	...	1	..	..	..	..	..	..	...	...	...	...	1	2	3	...	3	..	3	15	8	....	23
Totals....	44	14	2	1	4	4	42	27	3	36	58	11	16	89	104	193	4	1	12	6	9	4	27	9	4	1	2	96	69	39	94	49	143	619	642	8	1269

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

CLASS I.—ZYMOTIC DISEASES.

Towns in Fairfield Co.	Order 1.—Miasmatic.																					Order 2.—Enthetic.				Order 3.—Dietic.						Total for Class 1.		
	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittent Fever.	Remittent Fever.	Typho-Malarial Fever.	Congestive Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Pyaemia.	Total. M.	Total. F.	Syphilis.	Hydrophobia.	Total. M.	Total. F.	Privation.	Alcoholism.	Thrush.	Worms.	Total. M.	Total. F.	Male.	Female.	Total.
Danbury		1	1	2	1	1				3		4					1		1	4	11											4	11	15
Bridgeport		10	39	13	4	11	3			7	5	21	1	2	6	1	6	11		68	72						3			3		71	72	143
Bethel				1								1								1	1											1	1	2
Brookfield																										1					1		1	1
Darien														1				1			2												2	2
Easton															1						1												1	1
Fairfield		3	3	1						1		2	4		1		1			5	11											5	11	16
Greenwich	1	10	1			3				1		2				1				9	10											9	10	19
Huntington							1			1							2			3	1						1			1		4	1	5
Monroe																																		
New Canaan			1	1		1							3		1					3	4											3	4	7
New Fairfield				1																	5								1		1		2	2
Newtown						3						1								3	1											3	1	4
Norwalk		15	1	2	2	1				6	1	9		1	6			1		26	19											26	19	45
Reading		1		2																	3												3	3
Ridgefield								1			1									1	1											1	1	2
Sherman					1							1		2				1		4	1											4	1	5
Stamford	3		5	7	1	4	1	1		4	3	9	1		1	1	1	1		26	17	1		1								27	17	44
Stratford		1	1					1									1			2	2											2	2	4
Trumbull			2									1			2					1	4											1	4	5
Weston						1														1												1		1
Westport				2			1			1	1	2			3	1		2		5	8											5	8	13
Wilton						1			1	1										1	2											1	2	3
Totals	4	41	54	32	9	26	6	3	1	25	11	53	9	6	21	4	12	17	1	163	172	1	....	1	...	1	4	..	1	4	2	168	174	342

Towns in Fairfield County.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
Danbury	2	5	2	4	5	1		23		15	9	19	14	33
Bridgeport	14	7		6	15	2	1	61	3	37	30	43	45	88
Bethel								8		4	4	4	4	8
Brookfield	1			1				1			1	1	1	2
Darien		2			2			1		1		1	2	3
Easton			1		1								1	1
Fairfield								4		1	3	1	3	4
Greenwich		2			2	1	1	11	1	5	8	5	10	15
Huntington		2		1	1			6		2	4	3	5	8
Monroe								1			1		1	1
New Canaan								5		2	3	2	3	5
New Fairfield		2		2				2			2	2	2	4
Newtown	2				2			9		6	3	6	5	11
Norwalk	5	7		3	9		1	40		23	18	26	27	53
Redding		2			2			7		5	2	5	4	9
Ridgefield	1	2		1	2			2		1	1	2	5	5
Sherman		2			2			3		1	2	1	4	5
Stamford	6	2		2	6			20		8	12	10	18	28
Stratford		1		1			1	6		2	5	3	5	8
Trumbull	1	1		1	1			1			1	1	2	3
Weston		2		1	1			1		1		2	1	3
Westport	2	4		3	3			2			2	3	5	8
Wilton	1		1	1	1			6		4	2	5	3	8
Total	35	43	4	27	55	4	4	220	4	118	113	145	168	313

Towns in Fairfield County.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexia.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Brain Disease.	Meningitis.	Total. M.	Total. F.	Order 2.—System of Circulation. Pericarditis.	Aneurism.	Heart Disease.	Total. M.	Total. F.	Order 3.—Respiratory System. Laryngitis.	Bronchitis.	Pleurisy.	Pneumonia.	Asthma.	Lung Disease.	Total. M.	Total. F.
Danbury	2	5	2			3	1	2	7	8			6	3	3				5		4	7	2
Bridgeport	11	8	1		1	15	15	6	32	25	1		15	12	4	1	5	2	18		3	18	11
Bethel	3			1		1	1		2	4			1	1					1	1	3	2	3
Brookfield	2	2					1		4	1			1	1									
Darien		1								1									4			1	3
Easton													4	3	1		1		2			2	1
Fairfield		2							1	1		1	5	3	3			2	6		1	5	4
Greenwich	2	2			1		4		3	6			8	5	3				10	3		9	4
Huntington					1		2		2	1									2		1	2	1
Monroe	1	1						1	1	2			1		1								
New Canaan	3					2			3	2			3		3				3			3	3
New Fairfield							1		1				1		1				7		1		2
Newtown	2	2				3	1		2	6			4	1	3	1			7			3	5
Norwalk	9	14			1	7	4	5	17	23			8	3	5		5		22		5	22	10
Redding	2				1				1	2			1		1				1				1
Ridgefield	2	2					1		4	1			2	2			1		1		4	3	3
Sherman		1								1									2		1	2	1
Stamford	2	4	2	1		5	2	2	12	6			10	6	4		2		14	2		13	5
Stratford		1		1		1	2		3	2			1		1				2		1	1	2
Trumbull						1				1							1		1				2
Weston	1	1				1			2	1			1		1				1		2	1	2
Westport		3				2		1	2	4			5	2	3				2			1	1
Wilton													1	1									
Total	42	48	5	3	5	41	35	17	99	98	1	1	78	43	37	2	15	4	105	6	26	95	66

CLASS III.—LOCAL DISEASES—Concluded.

Towns in Fairfield Co.	Order 4.—Digestive Organs.														Order 5.—Urinary Organs.								Order 6.—Generative Organs.			Order 7.—Locomotive Organs.					Order 8.—Integumentary System.				Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ulceration of Intestines.	Hernia.	Tumor of Bowels.	Intussusception.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Total. M.	Total. F.	Nephritis.	Bright's Disease.	Diabetes.	Cystitis.	Kidney Disease.	Uræmia.	Total. M.	Total. F.	Ovarian Dropsy.	Disease of Uterus.	Total.	Arthritis.	Joint Disease.	Caries and Necrosis.	Total. M.	Total. F.	Phlegmon.	Ulcer.	Total. M.	Total. F.	Males.	Females.	Total.
Danbury	1		2									1	3	1			1				1										1			1	21	15	36
Bridgeport	4	4	2	2	1		1	1				1	6	10		4			3		3	4	2	1	3	1				1					71	58	129
Bethel	1												1			1					1			1	1										7	8	15
Brookfield	1							1					1	1																					6	2	8
Darien									-1				1																						2	4	6
Easton	1													1										1	1										5	4	9
Fairfield						1								1	1		1				2		1		1			1		1					11	11	22
Greenwich	1		2		1			1					1	4	1							1	1		1							2	1	1	19	20	39
Huntington						1								1			1			1		2													5	5	10
Monroe																1					1														2	4	6
New Canaan			2								1		1	2		2					2														9	7	16
New Fairfield																																			1	3	4
Newtown		2		1								1	3	1		1					1														10	15	25
Norwalk	4	1	1	1	1			5		1			7	7	2	4		1	1		5	3					1		1						55	48	103
Redding																	1				1														2	4	6
Ridgefield		1																			1														10	4	14
Sherman				1								1	2																						4	2	6
Stamford	2			1							2	2	5	2		1					1														37	17	54
Stratford			1									1	2			1						1													6	6	12
Trumbull																																				3	3
Weston			1										1																						4	4	8
Westport	1		3										1	3		1					1														7	11	18
Wilton								1					1						1		1		1		1										3	1	4
Totals	16	8	14	6	3	2	1	9	1	1	3	7	36	34	4	16	4	1	5	1	21	11	5	3	8	1	1	1	1	2	1	2	1	2	297	256	553

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Fairfield Co.	Order 1.—of Children. Stillborn.	Premature Birth and Debility.	Cyanosis.	Teething.	Total. M.	Total. F.	Order 2.—of Women. Childbirth.	Order 3.—of Old People. Old Age. M.	Old Age. F.	Order 4. of Nutrition. Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Males.	Females.	Total.
Danbury	1	....	1	..	1	1	1	7	14	...	1	8	17	25
Bridgeport	5	21	2	3	16	15	2	5	4	5	8	26	29	55
Bethel	3	1	..	..	3	1	1	...	2	...	...	3	4	7
Brookfield	..	1	..	..	..	1	.....	...	...	...	...	...	1	1
Darien	..	3	..	..	2	1	.....	1	1	...	...	3	2	5
Easton	1	....	..	..	1	..	.....	1	2	...	...	2	2	4
Fairfield	1	3	2	..	5	1	.....	1	...	...	...	6	1	7
Greenwich	..	....	..	..	..	..	3	4	2	...	1	4	6	10
Huntington	..	1	..	..	..	1	1	4	...	...	...	4	2	6
Monroe	..	....	..	..	..	..	.....	...	1	...	...	...	1	1
New Canaan	..	....	..	..	..	..	.....	1	1	...	...	1	1	2
New Fairfield	..	....	..	..	..	..	2	2	...	...	...	2	2	4
Newtown	4	....	..	..	..	4	1	3	1	...	3	3	9	12
Norwalk	6	3	..	..	2	7	1	5	6	...	...	7	14	21
Redding	1	1	..	..	..	2	.....	3	2	...	...	3	4	7
Ridgefield	1	....	..	..	..	1	.....	1	3	...	...	1	4	5
Sherman	..	....	..	..	..	..	.....	2	1	...	...	2	1	3
Stamford	..	....	..	..	..	..	2	6	2	5	5	11	9	20
Stratford	..	2	..	..	2	..	.....	2	1	1	..	5	1	6
Trumbull	..	....	..	..	..	..	.....	3	...	...	...	3	...	3
Weston	..	....	..	..	..	..	.....	1	1	...	...	1	1	2
Westport	2	2	..	..	2	2	1	1	2	1	1	4	6	10
Wilton	..	....	..	..	..	..	1	1	..	...	...	1	1	2
Total	25	38	5	3	34	37	16	54	46	12	19	100	118	218

CLASS V.—VIOLENT DEATHS.

Towns in Fairfield Co.	Order 1.—Accident or Negligence. Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, 5. Homicide. M.	Order 3.—Suicide. M.	Suicide. F.	Hanging.	Order 6. Violent Death not Casualty.	Sudden; Cause unascertained.	Cause not reported.	Total. M.	Total. F.	Total for Class V. Males.	Females.	Total.	Grand Total for All Classes. Males.	Females.	Total.	Sex not stated.
Danbury	..	..	..	..	1	..	2	2	1	..	1	1	..	....	2	47	23	26	26	28	54	78	85	173	10
Bridgeport	9	..	2	2	2	1	1	11	6	..	1	.	1	....	4	3	..	8	12	14	26	223	218	452	11
Bethel	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	....	1	..	1	..	1	16	17	33	..
Brookfield	..	..	..	..	..	..	..	..	..	..	..	..	..	....	2	...	1	1	1	1	2	8	6	14	..
Darien	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	1	..	1	..	1	1	6	11	18	1
Easton	..	..	..	..	..	..	1	..	1	..	..	..	..	....	....	....	..	..	..	1	1	9	7	16	..
Fairfield	1	..	..	..	..	..	..	1	..	..	1	..	..	....	....	....	..	..	2	..	2	25	26	51	..
Greenwich	2	..	..	..	..	..	1	2	1	..	..	..	..	....	....	....	..	..	2	1	3	39	47	86	..
Huntington	..	..		..	..	..	2	2	..	..	..	..	..	....	....	1	1	..	3	..	3	19	13	32	..
Monroe	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	1	1	..	1	.	1	3	5	8	..
New Canaan	1	..	..	..	..	..	..	..	1	..	1	..	..	....	....	....	..	..	1	1	2	16	16	32	..
New Fairfield	1	..	..	..	..	..	..	..	1	..	..	..	..	....	....	....	..	..	..	1	1	5	10	15	..
Newtown	1	..	..	..	..	..	1	2	..	..	1	.	..	....	....	....	..	2	3	2	5	25	32	57	..
Norwalk	1	1	..	1	1	..	1	3	2	..	1	..		....	....	....	..	..	4	2	6	118	110	230	2
Redding	..	..	1	..	..	..	..	1	..	..	..	..	..	....	....	....	.	1	1	..	1	11	15	26	..
Ridgefield	..	..	..	1	..	..	..	1	..	..	1	..	..	....	....	1	..	..	2	1	3	16	13	30	1
Sherman	..	..	..	..	..	..	.	..	..	..	1	..	..	....	....	1	1	..	2	..	2	13	8	21	..
Stamford	..	..	..	1	..	..	..	1	..	..	3	..	..	3	1	1	4	..	8	..	8	93	61	154	..
Stratford	1	..	..	..	..	..	..	1	..	1	1	1	..	..	....	....	..	..	3	1	4	19	15	34	..
Trumbull	1	..	..	..	..	..	..	1	..	..	..	..	..	....	....	2	2	..	3	..	3	8	9	17	..
Weston	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	..	..	..	..	...	8	6	14	..
Westport	..	..	..	1	..	..	..	..	1	..	..	1	..	1	....	3	3	1	3	3	6	22	33	55	..
Wilton	1	..	..	..	..	..	3	3	1	..	..	..	..	....	....	....	..	..	3	1	4	13	8	21	..
Total	19	1	3	6	4	1	12	31	17	1	12	3	1	4	10	61	37	40	81	58	139	793	771	1589	25

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

Towns in Windham Co.	CLASS I.—ZYMOTIC DISEASES.																											
	Order 1.—Miasmatic.																	Order 2.—Enthetic.			Order 3.—Dietic.					Total for Class I.		
	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Dysentery.	Diarrhea.	Cholera Infantum.	Remittent Fever.	Congestive Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total.		Syphilis.	Total.		Worms.	Alcoholism.	Pyaemia.	Total.		Males.	Females.	Total.
																M.	F.		M.	F.				M.	F.			
Brooklyn				1						1	1					3										3		3
Ashford			4								1					4	1									4	1	5
Canterbury						1											1										1	1
Chaplin			1													1										1		1
Eastford																												
Hampton		1	3	1												4	1									4	1	5
Killingly	1	1	6		2	2			1	1	7			1		13	9									13	9	22
Plainfield		1				3	1		1		1		1			5	3									5	3	8
Pomfret			1			1				1		2				2	3									2	3	5
Putnam				4		2		1		3	5			1		11	5									11	5	16
Scotland																												
Sterling																												
Thompson			8	10	1	1	2				1				2	12	13									12	13	25
Voluntown				2	1						2					2	3									2	3	5
Windham			6		1	3		2			4					6	10									6	10	16
Woodstock			1			1			2						1	3	2									3	2	5
Totals	1	3	30	18	5	14	3	3	4	6	22	2	1	2	3	66	51									66	51	117

Towns in Windham Co.	CLASS II.—CONSTITUTIONAL DISEASES.												
	Order 1.—Diathetic.					Order 2.—Tubercular.							
	Dropsy and Anæmia.	Cancer.	Mortification.	Total.		Scrofula.	Tabes Mesenterica.	Phthisis.	Total.		Total for Class II.		
				M.	F.				M.	F.	Male.	Female.	Total.
Brooklyn							2	1		3		3	3
Ashford		1			1			3	1	2	1	3	4
Canterbury								4	4		4		4
Chaplin	2			1	1			3	1	2	2	3	5
Eastford								3	1	2	1	2	3
Hampton								1	1		1		1
Killingly		2			2		1	25	9	17	9	19	28
Plainfield	1	2		1	2			10	4	6	5	8	13
Pomfret	1	1			2	1		2	1	2	1	4	5
Putnam	2		1	1	2			15	8	7	9	9	18
Scotland	1				1			3	1	2	1	3	4
Sterling	1	2		2	1			1	1		3	1	4
Thompson	1			1			1	6	4	3	5	3	8
Voluntown								2		2		2	2
Windham	1	1	1	1	2			17	8	9	9	11	20
Woodstock								2		2		2	2
Totals	10	9	2	7	14	1	4	98	44	59	51	73	124

Towns in Windham Co.	CLASS III.—LOCAL DISEASES.																				
	Order 1.—Nervous System.									Order 2.—Organs of Circulation.					Order 3.—Respiratory System.						
	Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Convulsions.	Brain Disease.	Meningitis.	Total.		Pericarditis.	Aneurism.	Heart Disease.	Total.		Bronchitis.	Pleurisy.	Pneumonia.	Asthma.	Lung Disease.	Total.	
								M.	F.				M.	F.						M.	F.
Brooklyn				1		2		1	2			1	1			1	1		1	1	2
Ashford					1	1		1	1			1	1		1		3			2	2
Canterbury	2	1							3			3	1	2			1				1
Chaplin	1	1							2								1				1
Eastford		1						1									3		4	7	
Hampton	1					1		1	1								1				1
Killingly	2	7	1		1		5	9	7			13	5	8	1		13			6	8
Plainfield	5			1		2	1	2	7			4	2	2			5		3	5	3
Pomfret	2					1	1	3	1						1		2				3
Putnam	1				1		2	4		1		2		3	1	1	5	1	10	11	7
Scotland																			1		1
Sterling		3				1		1	2			1		1							
Thompson		1			1	3		3	2		1	1	1	1			12		1	9	4
Voluntown		1				1		2				4	2	2							
Windham	4	6				4		8	6			8	2	6	1	1	1	1	4	3	5
Woodstock						3		3				1	1								
Totals	18	21	1	2	4	19	9	39	34	1	1	39	16	25	5	3	48	2	24	44	38

CLASS III.—LOCAL DISEASES—Concluded.

Towns in Windham Co.	Order 4.—Digestive Organs.												Order 5.—Urinary Organs.							Order 6.—Generative Organs.			Order 7.—Integumentary.		Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ulceration of Intestines.	Hernia.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Total. M.	Total. F.	Nephritis.	Bright's Disease.	Diabetes.	Cystitis.	Kidney Disease.	Total. M.	Total. F.	Ovarian Dropsy.	Disease of Uterus.	Total. F.	Skin Disease. M.	Skin Disease. F.	Males.	Females.	Total.
Brooklyn					1	1				1	1	2											1		5	6	11
Ashford			1					1		1	1	2				1		1							6	5	11
Canterbury																									1	6	7
Chaplin		1									1														1	3	4
Eastford																									8		8
Hampton																									1	2	3
Killingly	2				1					1	2	2					1	1							23	25	48
Plainfield					1		2		1		3	1					1	1			1	1			13	14	27
Pomfret		1							1		1	1		1				1							5	5	10
Putnam						4	2			1	4	3			1				1						19	14	33
Scotland	1										1														1	1	2
Sterling													1					1							2	3	5
Thompson	1					2		1		3	3	4	1	1			2	3	1						19	12	31
Voluntown															1			1							5	2	7
Windham	1	2								1	2	2		1					1	1		1			15	21	36
Woodstock		1	1	1								3		1				1							5	3	8
Totals	5	5	2	1	3	7	4	2	2	8	19	20	2	4	2	1	4	10	3	1	1	2	1	....	129	122	251

Towns in Windham Co.	Class IV.—Developmental. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Other Malformation.	Teething.	Total. M.	Total. F.	Orders 2, 3, 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Males.	Females.	Total.	Class V.—Violent Deaths. Order 1.—Accident or Negligence. Fractures.	Wounds.	Burns and Scalds.	Drowning.	Otherwise.	Total. M.	Total. F.	Order 4.—Suicide. Poison.	Drowning.	Hanging.	Otherwise.	Total. M.	Total. F.	Order 6. Violent.	Sudden.	Cause not reported.	Total. M.	Total. F.	Total for Class V. Males.	Females.	Total.	Grand Total for All Classes. Males.	Females.	Total.	Sex not stated.
Brooklyn	1	4	2	..	..	..	3	4	..	..	2	..	..	3	6	9	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	.	1	..	2	2	11	17	28	..
Ashford	.	..	..	..	..	..	..	..	1	..	..	..	1	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	11	22	..
Canterbury	..	1	..	..	..	..	..	1	..	..	1	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	9	14	..
Chaplin	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	1	1	4	7	11	..
Eastford	..	..	..	..	..	..	..	..	..	2	..	..	..	2	..	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	12	2	14	..
Hampton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	6	4	10	..
Killingly	10	5	..	..	..	..	8	6	1	3	3	..	..	11	11	22	..	..	1	..	4	4	1	..	..	1	1	1	1	..	..	..	..	..	5	2	7	61	66	129	2
Plainfield	5	2	..	..	..	..	4	3	1	1	2	..	..	5	6	11	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29	31	63	3
Pomfret	2	..	..	..	..	1	3	..	..	..	2	..	..	3	2	5	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	1	..	1	1	1	2	12	15	28	1
Putnam	1	3	..	..	..	1	4	1	1	1	4	..	..	5	6	11	1		..	1	..	1	1	..	..	..	1	1	..	1	..	14	12	8	14	9	23	50	51	101	..
Scotland	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	5	7	..
Sterling	1	..	..	..	..	..	..	1	..	..	1	1	..	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	6	12	..
Thompson	..	5	..	..	..	..	2	3	1	1	2	..	..	3	6	9	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	23	15	9	15	10	25	54	44	98	..
Voluntown	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	7	14	..
Windham	10	9	..	1	1	..	12	9	2	2	4	2	1	15	16	31	1	1	1	2	2	7	..	..	2	..	1	2	1	..	..	37	19	19	28	20	48	72	78	150	..
Woodstock	..	..	..	..	..	..	..		..	1	1	..	..	1	1	2	..	..		..	..	..	..	..	..	..	..	..		..	..	1	..	1	..	1	1	9	9	18	..
Totals	30	29	2	1	1	2	36	28	7	12	23	3	2	49	61	110	2	2	2	4	9	15	4	1	2	1	3	4	3	1	..	83	46	40	64	47	111	351	362	719	6

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

Towns in Litchfield Co.	CLASS I.—ZYMOTIC DISEASES.																											
	Order 1.—Miasmatic.																Order 2.—Enthetic.				Order 3.—Dietic.				Total for Class I.		
	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Dysentery.	Cholera Infantum.	Intermittent Fever.	Remittent Fever.	Typho-Malarial Fever.	Congestive Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Syphilis.	Hydrophobia.	Total. M.	Total. F.	Thrush.	Privation.	Total. M.	Total. F.	Male.	Female.	Total.
Litchfield		2				1	1		2							3	3									3	3	6
Barkhamsted			1											1		1	1									1	1	2
Bethlehem										1							1										1	1
Bridgewater																												
Canaan				1					1			1			1	1	3									1	3	4
Colebrook			1							1						1	1		1	1						2	1	3
Cornwall									1					1	1	1	2									1	2	3
Goshen								3								1	2									1	2	3
Harwinton				2													2										2	2
Kent							1		1		2					2	2						1		1	2	3	5
Morris																												
New Hartford	1			1	1	1								1		1	4					1			1	1	5	6
New Milford		1			4				1		1	2	1			8	2									8	2	19
Norfolk									2							1	1									1	1	2
North Canaan			2		1				1				1			4	1									4	1	5
Plymouth							1										1										1	1
Roxbury									2							1	1									1	1	2
Salisbury		1			2				7				1		1	6	6						1	1		7	6	13
Sharon		1			1												2										2	2
Thomaston		1			1											1	1									1	1	2
Torrington					2			6	1	1		2	1			6	7									6	7	13
Warren																												
Washington								5								1	4									1	4	5
Watertown									1							1										1		1
Winchester		2	8		3	3							1			9	8					1			1	9	9	18
Woodbury								1	1	1						2	1									2	1	3
Totals	1	9	12	4	15	5	3	15	21	4	3	5	5	3	3	51	56	...	1	1	...	2	2	1	3	53	59	112

CLASS II.—CONSTITUTIONAL DISEASES.

Towns in Litchfield Co.	Order 1.—Diathetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
Litchfield...	...	1	1	1	1	....	....	2	....	..	2	1	3	4
Barkhamsted..	1	1	....	..	2	....	....	..	....	..	..	..	2	2
Bethlehem.....	1	1	....	..	2	....	....	2	....	..	2	..	4	4
Bridgewater...	....	..	....	..	..	....	....	1	....	..	1	..	1	1
Canaan.......	1	1	....	2	..	....	....	..	....	..	..	2	..	2
Colebrook	....	1	....	1	..	....	....	3	....	3	..	4	..	4
Cornwall......	....	..	....	..	..	....	....	2	....	1	1	1	1	2
Goshen........	1	..	....	..	1	....	....	..	....	..	..	..	1	1
Harwinton	....	..	....	..	..	....	....	..	....	..	..	..	..	....
Kent	1	1	....	..	2	....	....	1	....	..	1	..	3	3
Morris........	....	1	....	1	..	1	....	5	....	3	3	4	3	7
New Hartford..	2	1	....	1	2	1	....	7	....	4	4	5	6	11
New Milford...	3	1	2	3	3	....	....	5	....	3	2	6	5	11
Norfolk...... ..	1	..	....	1	..	....	....	5	....	3	2	4	2	6
North Canaan .	2	1	....	1	2	....	...	1	....	..	1	1	3	4
Plymouth......	1	1	....	1	1	....	....	3	....	1	2	2	3	5
Roxbury......	....	..	....	..	..	....	....	5	....	2	3	2	3	5
Salisbury......	....	3	1	..	4	....	....	8	1	3	6	3	10	13
Sharon........	1	..	....	1	..	....	....	2	....	1	1	2	1	3
Thomaston....	....	1	....	..	1	....	1	3	1	1	4	1	5	6
Torrington....	1	..	....	1	..	1	....	3	3	4	3	5	3	8
Warren........	....	1	....	1	..	....	....	..	....	..	..	1	..	1
Washington....	....	1	....	..	1	....	1	3	....	2	2	2	3	5
Waterbury....	1	1	1	1	2	....	....	4	....	..	4	1	6	7
Winchester....	4	..	....	3	1	...	....	15	....	6	9	9	10	19
Woodbury.....	2	1	....	1	2	....	1	3	....	3	1	4	3	7
Totals	23	19	5	20	27	3	3	83	5	40	54	60	81	141

CLASS III.—LOCAL DISEASES.

Towns in Litchfield Co.	Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Brain Disease.	Spinal Disease.	Meningitis.	Total. M.	Total. F.
Litchfield...	2	..	....	..	....	..	..	....	....	1	1
Barkhamsted..	1	1	....	..	....	..	..	....	....	..	2
Bethlehem.....	..	..	....	..	....	..	1	....	....	1	..
Bridgewater...	..	..	....	..	....	..	..	....	....	..	..
Canaan.......	1	..	....	..	....	..	..	....	....	..	1
Colebrook	2	1	....	..	....	1	..	....	....	2	2
Cornwall......	..	..	....	..	....	..	..	....	....	..	..
Goshen........	3	..	....	..	....	..	..	....	....	2	1
Harwinton	..	1	....	..	....	3	..	....	....	2	2
Kent	..	..	....	..	....	..	..	....	....	..	..
Morris........	..	1	....	1	....	..	..	....	....	1	1
New Hartford..	..	5	....	1	....	4	..	....	2	5	7
New Milford...	2	5	....	1	1	..	2	....	1	7	5
Norfolk...... ..	..	1	....	3	....	1	..	....	....	3	2
North Canaan .	..	2	....	..	....	..	..	....	....	..	2
Plymouth......	1	..	1	..	....	..	2	....	....	3	1
Roxbury......	..	..	....	.	....	..	..	....	....	..	..
Salisbury......	3	4	....	..	....	2	..	....	....	5	4
Sharon........	..	1	....		....	..	1	....	....	1	1
Thomaston....	1	..	....	1	....	2	1	....	3	5	3
Torrington....	2	1	....	..	....	..	..	....	....	3	..
Warren........	2	..	....	..	....	..	..	....	....	2	1
Washington....	5	..	....	..	1	1	..	1	...	5	2
Waterbury....	..	1	....	..	....	2	3	....	....	3	3
Winchester....	1	6	....	..	....	1	1	....	....	3	6
Woodbury.....	5	..	2	..	....	..	3	....	....	4	6
Totals	31	30	3	7	2	17	14	1	6	58	53

Towns in Litchfield Co.	Order 2.—Circulation. Pericarditis.	Aneurism.	Heart Disease.	Embolism.	Total. M.	Total. F.	Order 3.—Respiratory System. Bronchitis.	Pleurisy.	Pneumonia.	Asthma.	Lung Disease.	Total. M.	Total. F.
Litchfield...	..	....	2	....	2	..	1	....	4	....	..	1	4
Barkhamsted..	..	....	1	....	1	..	1	....	5	....	..	3	3
Bethlehem.....	..	....	..	....	....	..	....	....	1	....	..	1	..
Bridgewater...	..	....	2	....	1	1	...	....	..	....	..	..	..
Canaan.......	..	1	1	....	2	..	...	....	3	....	..	2	1
Colebrook	..	....	..	....	....	..	1	....	1	....	1	..	3
Cornwall......	..	....	1	....	1	..	....	....	2	....	..	..	2
Goshen........	..	....	2	....	....	2	....	....	1	....	..	..	1
Harwinton	..	....	1	....	....	1	....	....	..	....	..	..	..
Kent	..	....	..	....	....	..	....	....	..	....	..	..	..
Morris........	..	....	2	....	1	1	....	....	..	....	..	..	..
New Hartford..	..	....	8	....	5	3	....	....	7	....	1	3	5
New Milford...	..	....	1	....	1	..	1	....	2	....	..	2	1
Norfolk...... ..	..	....	..	....	....	..	....	....	2	....	3	3	2
North Canaan .	..	....	1	...	....	1	....	....	1	....	..	..	1
Plymouth......	..	....	1	....	1	.	....	....	1	....	..	1	..
Roxbury......	..	....	..	....	....	..	....	....	..	....	..	..	..
Salisbury......	..	....	2	....	2	..	....	....	5	....	5	5	5
Sharon........	..	....	..	....	....	..	....	....	2	....	2	2	2
Thomaston....	..	....	..	....	....	..	....	....	3	....	1	2	2
Torrington....	1	....	4	1	3	3	....	1	2	1	..	3	1
Warren........	..	....	..	....	....	..	....	....	2	....	.	1	1
Washington....	..	1	2	....	3	..	....	...	4	....	1	2	3
Waterbury....	..	....	..	1	....	1	....	....	1	....	..	1	..
Winchester....	..	....	2	....	....	2	....	3	5	....	..	6	2
Woodbury.....	..	....	.	....	....	..	....	....	1	....	1	1	1
Totals	1	2	33	2	24	15	4	4	55	1	15	39	40

CLASS III.—LOCAL DISEASES—Concluded.

Towns in Litchfield Co.	Order 4.—Digestive Organs.										Order 5.—Urinary Organs.								Orders 6, 7, 8.					Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ulceration of Intestines.	Hernia.	Stomach Disease.	Jaundice.	Liver Disease.	Total.		Bright's Disease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Uræmia.	Total.		Disease of Uterus.	Joint Disease.		Phlegmon.		Males.	Females.	Total.
									M.	F.							M.	F.		M.	F.	M.	F.			
Litchfield	...	...	...	...	...	...	1	1	2	...	1	1	...	...	1	..	2	1	...	...	...	...	...	8	6	14
Barkhamsted	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	4	5	9
Bethlehem	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	2	...	2
Bridgewater	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	..	1	...	...	...	...	...	...	2	1	3
Canaan	...	...	...	...	...	...	...	...	...	...	2	...	...	1	...	..	3	...	...	...	...	...	...	7	2	9
Colebrook	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	2	5	7
Cornwall	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	..	...	...	...	...	...	...	...	2	2	4
Goshen	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	2	4	6
Harwinton	...	...	1	...	...	...	...	3	3	1	...	...	...	...	...	..	...	...	...	...	...	...	...	5	4	9
Kent	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...
Morris	...	1	1	...	...	1	...	...	1	2	...	...	...	...	...	.	...	...	...	...	...	...	...	3	4	7
New Hartford	...	...	1	...	1	...	...	...	...	2	...	...	...	...	...	..	...	...	...	...	...	...	...	13	17	30
New Milford	1	...	...	...	...	1	2	...	2	2	1	1	...	...	...	1	2	1	...	...	...	...	...	14	9	23
Norfolk	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	..	...	...	...	...	...	...	...	6	5	11
North Canaan	...	...	2	...	...	...	...	1	2	1	1	...	...	...	...	..	1	...	...	...	...	...	...	3	5	8
Plymouth	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	..	2	...	1	...	...	...	...	7	2	9
Roxbury	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	..	...	...	...	...	...	...	...	1	...	1
Salisbury	1	...	...	3	...	...	...	...	2	2	3	...	...	...	...	..	2	1	...	...	...	...	...	16	12	28
Sharon	...	...	1	...	...	...	...	...	...	1	1	...	...	...	...	..	1	...	...	...	...	...	...	4	4	8
Thomaston	1	...	1	...	...	...	...	...	1	1	...	...	...	...	...	..	...	...	...	...	...	...	...	8	6	14
Torrington	...	...	1	1	1	...	...	2	2	3	1	...	...	...	...		1	...	...	...	...	...	...	12	7	19
Warren	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...	...	...	...	...	3	2	5
Washington	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	..	1	...	...	...	...	...	...	11	6	17
Watertown	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	..	...	...	...	...	1	...	...	5	5	10
Winchester	...	...	1	1	...	2	...	...	1	3	...	...	...	...	2	.	2	...	...	...	...	...	...	12	13	25
Woodbury	1	...	1	1	...	1	...	...	3	1	1	...	...	...	...	..	1	...	...	...	...	1	...	10	8	18
Totals	5	1	11	6	2	6	3	9	22	21	13	2	1	1	4	1	19	3	1	...	1	1	...	162	134	296

Towns in Litchfield Co.	Class IV.—Developmental Diseases.														Class V.—Violent Deaths.																	Grand Total for All Classes			
	Order 1.—Of Children.						Orders 2, 3, and 4.								Order 1.—Accident and Negligence.							Order 3.—Homicide.	Order 4.—Suicide.		Orders 5 and 6.										
	Stillborn.	Premature Birth.	Cyanosis.	Teething.	Total.		Childbirth.	Old Age.		Atrophy and Debility.		Total for Class IV.			Fractures.	Wounds.	Burns and Scalds.	Drowning.	Otherwise.	Total.					Sudden.	Cause not reported.	Total.		Total for Class V.			Males.	Females.	Sex not Stated.	Total.
					M.	F.		M.	F.	M.	F.	Male.	Female.	Total.						M.	F.	F.	M.	F.			M.	F.	Male.	Female.	Total.				
Litchfield		2			2			3				5		5	1	1					2			1	1		1		1	3	4	18	15		33
Barkhamstead										1	1	1	1	2																		6	9		15
Bethlehem	1					1		1	1			1	2	3																		3	7		10
Bridgewater	1				1				1			1	1	2																		3	3		6
Canaan		1			1			1				2		2																		12	5		17
Colebrook		3			2	1		1	3			3	4	7												3	3		3		3	14	10		24
Cornwall								2				2		2												1		1		1	1	6	6		12
Goshen	1				1			3	1			4	1	5		1	1			2									2		2	9	8		17
Harwinton								1	2			1	2	3					1		1					1		1		2	2	6	10		16
Kent																																2	6		8
Morris									2				2	2	1					1									1		1	8	9		17
New Hartford		2			2			1	1			1	3	4																		22	29		51
New Milford				1	2	1		2	4	1		5	5	10		1			1		2		1			2		2	1	4	5	34	25		59
Norfolk									2				2	2				1		1						2	2		3		3	14	10		24
North Canaan								1	1			1	1	2												1		1		1	1	9	11		20
Plymouth		2				2			3				5	5									1						1		1	10	11		21
Roxbury				1		1			1				2	2																		4	6		10
Salisbury		1				1			1				2	2					3		3									3	3	26	13		59
Sharon								1	2			1	2	3												8	3	5	3	5	8	10	14		24
Thomaston		1	2		1	2	1					1	3	4																		11	15		26
Torrington				1																			1			1		1	1	1	2	24	18		42
Warren																																5	2		7
Washington		1	1			2		1	1			1	3	4								1	1			1		1	1	2	3	16	18		34
Watertown	4				3	1		1	2	1	1	5	4	9																		12	15		27
Winchester							1	1	5			1	6	7	3				1		4		1						1	4	5	32	42		74
Woodbury									1				1	1					1		1		1			3	3		4	1	5	20	14		34
Totals	9	13	3	2	10	12	2	20	34	3	2	36	52	88	5	3	1	1	7	4	13	1	6	1	1	23	12	12	22	27	49	336	351		687

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

Towns in Middlesex Co.	CLASS I.—ZYMOTIC DISEASES.																																					
	Order I.—Miasmatic.																						Order II.—Enthetic.					Order III.—Dietic.						Total for Class I.		
	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittent Fever.	Typho-Malarial Fever.	Congestive Fever.	Rheumatism.	Measles.	Remittent Fever.	Small-pox.	Cholera.	Influenza.	Total. M.	Total. F.	Syphilis.	Strict're of Urethra.	Hydrophobia.	Total. M.	Total. F.	Thrush.	Alchoholism.	Privation.	Purpura.	Total. M.	Total. F.	Male.	Female.	Total.
Middletown	9	7	..	5	1	2	1	..	..	..	3	8	..	2	..	2	..	..	..	..	..	22	18	..	..	..	..	..	..	..	..	..	..	..	22	18	40
Haddam	..	..	..	..	2	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	2	2	4
Chatham	..	..	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	3	3
Chester	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Clinton	..	..	..	..	3	..	..	..	..	1	..	1	..	2	..	..	..	..	..	..	..	4	3	..	..	..	..	..	..	..	..	..	..	..	4	3	7
Cromwell	3	..	..	1	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	5	2	..	..	..	..	..	..	..	..	..	..	..	5	2	7
Durham	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	1	..	2	..	2
East Haddam	..	1	..	1	1	..	..	..	..	..	..	3	1	..	..	..	..	..	..	..	..	6	1	..	..	..	..	..	..	..	..	..	..	..	6	1	7
Essex	3	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	..	..	..	..	..	..	..	..	1	4	5
Killingworth	4	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..	..	..	..	..	..	..	..	..	..	7	7
Middlefield	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	1	2
Old Saybrook	3	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	2	3	..	..	..	..	..	..	..	..	..	..	..	2	3	5
Portland	10	1	..	7	1	..	..	..	..	2	..	5	..	1	1	..	..	..	..	..	..	12	16	..	..	..	..	..	..	..	..	..	..	..	12	16	28
Saybrook	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Westbrook	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Totals	33	10	1	15	9	5	3	1	1	3	3	21	3	5	1	5	..	..	..	..	..	57	62	..	..	..	..	..	..	1	..	..	1	..	58	62	120

Towns in Middlesex County.	CLASS II—CONSTITUTIONAL. Order 1.—Diethetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Phthisis.	Tabes Mesenterica.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Males.	Females.	Total.
Middletown	2	5	..	3	4	2	25	1	3	13	18	16	22	38
Haddam	..	1	..	..	1	..	3	..	..	1	2	1	3	4
Chatham	2	3	..	2	3	..	2	..	..	..	2	2	5	7
Chester	..	2	..	1	1	..	5	..	..	3	2	4	3	7
Clinton	..	..	2	1	1	..	7	..	..	3	4	4	5	9
Cromwell	..	..	..	..	..	..	..	..	1	..	1	..	1	1
Durham	..	2	..	..	2	..	2	..	..	1	1	1	3	4
East Haddam	..	..	..	..	..	..	7	..	..	2	5	2	5	7
Essex	3	1	..	1	3	..	1	..	..	..	1	1	4	5
Killingworth	..	1	..	1	..	..	2	..	..	1	1	2	1	3
Middlefield	..	2	..	..	2	..	2	..	..	2	..	2	2	4
Old Saybrook	..	..	1	1	..	..	1	1	..	..	2	1	2	3
Portland	5	2	..	4	3	..	20	..	..	11	9	15	12	27
Saybrook	..	..	..	..	..	..	4	..	..	..	4	..	4	4
Westbrook	2	..	..	1	1	..	2	..	..	1	1	2	2	4
Totals	14	19	3	15	21	2	83	2	4	38	53	53	74	127

Towns in Middlesex County.	CLASS III—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Convulsions.	Brain Disease.	Spinal Disease.	Meningitis.	Total. M.	Total. F.	Order 2.—Organs of Circulation. Pericarditis.	Heart Disease.	Embolism.	Total. M.	Total. F.	Order 3.—Respiratory System. Laryngitis.	Bronchitis.	Pneumonia.	Asthma.	Lung Disease.	Total. M.	Total. F.
Middletown	4	10	3	..	1	5	1	2	13	13	1	14	1	7	9	..	5	8	..	..	7	6
Haddam	2	1	..	..	..	..	..	..	2	1	..	3	..	1	2	..	..	1	..	1	1	1
Chatham	..	1	1	..	..	..	..	..	2	..	..	1	..	..	1	..	..	2	..	1	2	1
Chester	1	1	..	..	1	..	..	..	1	2	..	1	..	1	..	..	1	3	2	..	2	4
Clinton	1	..	..	..	1	2	..	2	2	4	..	3	..	1	2	..	1	4	..	1	2	4
Cromwell	..	..	..	1	..	..	..	..	1	..	..	2	..	2	..	..	..	..	..	..	..	..
Durham	..	..	..	..	..	..	..	1	1	..	..	4	..	..	4	..	..	1	..	..	1	..
East Haddam	3	1	..	1	1	2	..	..	6	2	..	2	..	1	1	..	2	2	..	..	2	2
Essex	1	1	..	..	1	1	..	1	..	5	..	1	..	1	..	..	..	1	..	..	1	..
Killingworth	..	1	..	..	1	..	..	..	1	1	..	1	..	..	1	..	1	1	..	1	1	2
Middlefield	1	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	1	..	..	1	..
Old Saybrook	2	..	..	..	1	1	..	..	1	3	..	..	..	..	..	..	..	..	..	3	2	1
Portland	2	..	..	..	1	6	..	..	2	7	..	3	..	2	1	..	..	5	1	..	4	2
Saybrook	..	..	1	..	1	1	..	..	3	..	..	1	..	..	1	1	..	1	..	..	1	1
Westbrook	..	1	..	..	..	..	..	..	..	1	..	1	..	1	..	..	..	1	..	..	1	..
Totals	17	18	5	2	9	18	1	6	36	40	1	37	1	17	22	1	10	31	3	7	28	24

CLASS III.—LOCAL DISEASES—Concluded.

Towns in Middlesex Co.	Order 4.—Digestive Organs.											Order 5.—Urinary Organs.								Order 6.—Generative Organs.			Order 8—Integ'm'y System.		Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Stomach Disease.	Colic.	Hepatitis.	Liver Disease.	Total. M.	Total. F.	Prostatitis.	Bright's Disease.	Diabetes.	Kidney Disease.	Calculus.	Uræmia.	Total. M.	Total. F.	Ovarian Dropsy.	Disease of Uterus.	Total.	Phlegmon. M.	Phlegmon. F.	Male.	Female.	Total.
Middletown	1	2	2	1	....	3	1	....	4	3	11	....	2	2	....	1	....	3	2	....	1	1	....	1	33	43	76
Haddam	....	....	..	....	....	....	....	....	....	..	..	....	....		1	....	....	....	1	....	....	....	....	....	4	5	9
Chatham	....	....	..	....	....	....	....	....	....	..	..	1	..	....	....	....	....	1	....	....	....	....	....	....	5	2	7
Chester	....	....	1	..	....	....	....	....	....	1	..	....	....	....	....	....	....	....	....	....	....	..	....	....	5	6	11
Clinton	....	....	..	1	....	....	....	..	1	..	2	....	....	....	....	...	....	....	....	1	...	1	....	....	5	13	18
Cromwell	....	....	1	....	...	1	1	....	....	1	2	....	....	....	1	....	....	1	....	....	....	....	....	....	5	2	7
Durham	....	....	..	....	....	....	....	....	....	..	..	1	....	....	....	....	....	1	....	....	....	....	....	....	3	4	7
East Haddam	....	....	1	....	2	....	....	..	1	1	3	....	...	....	....	....	....	....	....	....	....	....	....	....	10	8	18
Essex	1	....	1	....	...	....	....	1	....	2	1	...	1		1	....	..	1	1	....	....	....	....	....	5	7	12
Killingworth	....	....	..	....	....	....	....	....	....	..	..	....	....	....	1	....		1	....	....	....	....	..	....	3	4	7
Middlefield	1	....	..	....	...	....	....	....	....	1	..	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	4
Old Saybrook	....	....	1	....	....	...	....	....	....	..	1	....	1	....	..	....	....	....	1	....	....	....	....	....	3	6	9
Portland	...	....	1	....	....	....	....	....	....	..	1	....	....	...	....	....	1	....	1	....	....	....	...	....	8	12	20
Saybrook	....	....	.	....	....	...	....	1	....	..	1	....	...	....	....	....	....	....	....	....	....	....	....	....	4	3	7
Westbrook	....	1	1	....	....	....	....	....	....	1	1	....	....	....	....	....	..	....	....	....	....	....	....	....	3	2	5
Totals	3	3	9	2	2	4	2	2	6	10	23	2	4	2	4	1	1	8	6	1	1	2	....	1	99	118	217

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Middlesex Co.	Order 1.—Of Children. Stillborn.	Premature Birth.	Spina Bifida.	Other Malformations.	Total. M.	Total. F.	Order 2.—Of Women. Childbirth.	Order 3—Of Old People. Old Age. M.	Old Age. F.	Order 4—Nutrit'n. Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Total.
MIDDLETOWN	5	3	1	....	2	7	1	3	8	1	4	7	20	27
Haddam	3	..	....	....	3	..	....	...	....	....	....	3	....	3
Chatham	1	..	....	....	1	..	....	....	4	....	1	1	5	6
Chester	1	..	....	...	1	..	....	2	....	....	....	3	....	3
Clinton	..	..	....	....	..	..	....	2	1	1	....	3	1	4
Cromwell	..	1	....	....	..	1	....	2	...	....	....	2	1	3
Durham	..	1	....	....	1	..	....	1	1	....	....	2	1	3
East Haddam	..	..	....	....	..	..	1	2	2	....	....	2	3	5
Essex	..	..	....	1	..	1	....	....	....	1	1	1	2	3
Killingworth	..	..	....	1	1	..	....	3	2	....	....	4	2	6
Middlefield	..	..	....	....	..	..	....	....	....	....	....	....	....	....
Old Saybrook	..	..	....	....	..	.	1	1	....	1	....	2	1	3
Portland	..	2	....	....	1	1	2	....	2	2	....	2	5	7
Saybrook	..	..	....	....	..	..	....	....	....	....	....	....	....	....
Westbrook	..	.	....	....	..	..	....	....	....	....	....	....	....	....
Totals	10	7	1	2	10	10	5	16	20	6	6	32	41	73

CLASS V.—VIOLENT DEATHS.

Towns in Middlesex Co.	Order 1.—Accident and Negligence. Fractures.	Burns and Scalds.	Poison.	Drowning.	Otherwise.	Total. M.	Total. F.	Order 4.—Suicide. Drowning.	Otherwise.	Total. M.	Total. F.	Orders 5 & 6. Sudden.	Cause not reported.	Total. M.	Total. F.	Total for Class V. Male.	Female.	Total.	Grand Total for All Classes. Male.	Female.	Total.
MIDDLETOWN	4	1	...	4	1	9	1	....	..	....	....	....	1	..	1	9	2	11	86	106	192
Haddam	1	....	....	..	..	1	....	....	....	....	....	....	6	4	2	5	2	7	15	12	27
Chatham	..	....	....	..	..	....	....	....	....	....	....	....	..	..	..	..	..	..	8	15	23
Chester	..	....	....	..	..	....	....	....	....	....	....	....	..	..	..	..	..	..	12	10	22
Clinton	..	1	....	1	..	1	1	....	1	....	1	....	1	1	..	2	2	4	18	24	42
Cromwell	1	....	....	..	..	....	1	....	....	....	....	....	1	1	..	1	1	2	13	7	20
Durham	1	....	....	..	..	....	1	....	....	....	....	....	..	..	..	..	1	1	8	9	17
East Haddam	1	....	....	..	..	....	1	..	....	....	....	2	2	2	2	2	3	5	22	20	42
Essex	1	....	....	..	1	2	....	....	....	....	....	....	1	..	1	2	1	3	10	18	28
Killingworth	..	....	....	..	1	1	....	....	....	....	....	....	..	..	..	1	..	1	10	14	24
Middlefield	..	....	....	..	..	....	....	....	....	....	....	....	..	..	..	..	..	..	6	4	10
Old Saybrook	..		....	..	..	....	....	....	....	....	....	..	2	..	2	..	2	2	8	14	22
Portland	..	....	1	..	1	2	...	1	....	1	...		3	..	3	3	3	6	41	48	89
Saybrook	..	....	....	..	..	....	....	....	....	....	....	....	..	..	..	..	..	..	5	7	12
Westbrook	..	....	....	..	..	....	....	....	....	....	....	1	3	1	3	1	3	4	6	8	14
Totals	9	2	1	5	4	16	5	1	1	1	1	3	20	9	14	26	20	46	268	316	584

TABLE.

CAUSES OF DEATHS, ARRANGED BY TOWNS.

CLASS I.—ZYMOTIC DISEASES.

Towns in Tolland Co.	Order 1.—Miasmatic. Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Pyaemia.	Dysentery.	Diarrhea.	Cholera Infantum.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Order 2.—Enthetic. Syphilis.	Hydrophobia.	Total. M.	Total. F.	Order 3.—Dietic. Privation.	Purpura.	Alcoholism.	Thrush.	Total. F.	Total. M.	Total for Class 1. Male.	Female.	Total.
Tolland							1														1							1			1		2	2
Andover																																		
Bolton																																		
Columbia																																		
Coventry		2											1							1	2											1	2	3
Ellington											1	1	1			1				2	2							1		1		3	2	5
Hebron						1	1													2												2		2
Mansfield			3			1															4												4	4
Somers								1													1												1	1
Stafford			1		1	2												2		2	4											2	4	6
Union						2							1							2	1											2	1	3
Vernon			2			4					1	1	7			1	1	1	2	6	14								1	1		7	14	21
Willington						1															1												1	1
Totals		2	6		1	11	2	1			2	2	10			2	1	3	2	15	30							2	1	2	1	17	31	48

Towns in Tolland County.	Class II.—Constitutional. Order 1.—Diethetic. Dropsy and Anæmia.	Cancer	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Males.	Females.	Total.	Class III.—Local Disease. Order 1.—Nervous System. Apoplexy.	Paralysis.	Convulsions.	Brain Disease.	Meningitis.	Spinal Disease.	Total. M.	Total. F.	Order 2.—of Organs. Cir'lation. Aneurism.	Heart Disease.	Pericarditis.	Total. M.	Total. F.	Order 3.—Respiratory System. Bronchitis.	Pleurisy.	Pneumonia.	Lung Disease.	Total. M.	Total. F.
Tolland		2	1		3			3		1	2	1	5	6	2	2		1			1	4		1	1	1	1			2	1	1	2
Andover																															1	1	
Bolton																														1	2		3
Columbia		1			1			2			2		3	3	1							1		1		1				1		1	
Coventry		2		1	1			11		2	9	3	10	13	1			1				2			2		2	4		3		2	5
Ellington		1		1				4		1	3	2	3	5	2							2								3	1	3	1
Hebron								6	1	5	2	5	2	7	3			1			1	3											
Mansfield		1			1	1		4		3	2	3	3	6	1			1			1	1		1			1	3		3	1	1	6
Somers	1				1			1		1		1	1	2	1	1	1		1		2	2	1	1		1	1			5		2	3
Stafford								7	1	3	5	3	5	8	1	3						4		2			2			4	1	2	3
Union								1			1		1	1										1		1							
Vernon		1			1		2	17	1	7	13	7	14	21	1	1	3	1	1		3	4		1	1	2			1	5	2	6	2
Willington	2	2			4								4	4																	2		2
Totals	3	10	1	2	12	1	2	56	3	23	39	25	51	76	13	7	4	5	2	....	8	23	1	8	4	6	7	7	1	27	11	19	27

CLASS III.—LOCAL DISEASES—Concluded.

Towns in Tolland Co.	Order 4.—Digestive Organs.											Order 5.—Urinary Organs.							Order 6.—Gen'ative Organs.			Order 7.—Organs of Locomotion.				Order 8.—Integumentary System.						Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ulceration of Intestines.	Hernia.	Stomach Disease.	Hepatitis.	Liver Disease.	Spleen Disease.	Total. M.	Total. F.	Bright's Disease.	Diabetes.	Cystitis.	Prostatitis.	Kidney Disease.	Total. M.	Total. F.	Ovarian Dropsy.	Disease of Uterus.	Total. F.	Joint Disease.	Necrosis and Caries.	Total. M.	Total. F.	Tumor.	Phlegmon.	Ulcer.	Skin Disease.	Total. M.	Total. F.	Males.	Females.	Total.
Tolland	..	..	..	....	..	.	..	..	1	1	....	..	..	..	..	..	....	....	..	..	....	..	....	1	....	..	..	..	..	....	....	5	7	12
Andover	..	..	..	....	..	..	..	..	..	....	....	..	1	..	..	..	1	....	..	..	....	..	....	....	....	..	..	..	..	....	....	2	....	2
Bolton	..	..	1	....	..	..	..	..	..	....	1	..	..	..	..	..	....	....	..	..	....	..	....	....	....	..	..	..	..	....	....	....	4	4
Columbia	..	..	..	....	1	..	..	..	..	1	....	..	..	..	..	..	....	....	..	..	....	..	....	....	....	..	..	..	..	....	....	3	1	4
Coventry	1	..	..	2	..	..	..	1	..	....	4	..	..	..	..	..	....	....	..	..	....	..	....	....	....	..	..	..	..	....	....	2	13	15
Ellington	..	..	..	....	..	..	..	..	..	....	....	..	..	..	..	..	....	....	1	..	1	..	....	....	....	..	..	..	..	....	....	3	4	7
Hebron	..	..	..	....	..	..	..	..	..	....	....	1	..	..	..	..	1	....	..	..	....	..	....	....	....	..	..	..	..	....	....	2	3	5
Mansfield	..	..	..	....	..	..	..	..	..	....	....	1	..	..	..	..	1	....	..	..	....	..	....	....	....	..	1	..	..	....	1	3	9	12
Somers	1	..	1	....	..	..	..	..	..	1	1	..	..	..	..	..	....	....	..	..	....	..	....	....	....	..	..	..	..	....	....	6	7	13
Stafford	1	..	..	....	..	..	..	3	..	2	2	..	..	1	..	..	1	....	..	..	....	..	....	....	....	..	..	..	..	....	....	5	11	16
Union	..	..	..	....	..	..	..	..	..	....	....	..	..	..	..	..	....	....	..	..	....	..	....	....	....	..	..	..	..	....	....	1	....	1
Vernon	1	3	1	....	..	3	1	3	..	4	8	2	..	..	..	..	2	....	..	..	....	..	....	....	....	..	..	..	..	....	....	17	14	31
Willington	..	..	1	....	..	..	..	..	..	....	1	1	..	..	..	..	1	....	..	1	1	..	....	....	....	..	1	1	..	1	1	2	5	7
Totals	4	3	4	2	1	3	1	7	1	9	17	5	1	1	..	..	7	....	1	1	2	..	....	1	....	..	2	1	..	1	2	51	78	129

Towns in Tolland Co.	CLASS IV.—DEVELOPMENTAL DISEASES.														
	Order 1.—Of Children.							Orders 2, 3, and 4.							
	Stillborn.	Premature Birth and Infantile Debility.	Cyanosis.	Malformation.	Teething.	Total.		Childbirth.	Old Age.		Atrophy and Debility.		Total for Class IV.		
						M.	F.		M.	F.	M.	F.	Male.	Female.	Total.
Tolland	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1
Andover	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bolton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Columbia	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1
Coventry	2	1	...	...	...	2	1	...	1	...	...	...	3	1	4
Ellington	2	...	1	...	...	2	1	...	...	...	...	...	2	1	3
Hebron	...	...	...	...	...	...	...	1	...	...	...	...	...	1	1
Mansfield	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1
Somers	...	...	...	...	...	...	...	...	...	1	...	1	...	2	2
Stafford	...	2	...	...	...	2	...	...	3	...	...	...	5	...	5
Union	...	...	...	...	...	...	...	1	...	1	...	...	...	2	2
Vernon	3	6	...	2	3	7	7	2	1	3	...	...	8	12	20
Willington	1	4	...	...	1	2	4	...	1	4	...	...	3	8	11
Totals	8	13	1	2	4	15	13	4	6	12	...	1	21	30	51

Towns in Tolland Co.	CLASS V.—VIOLENT DEATHS.																			Grand Total for All Classes.			
	Order 1.—Accident or Negligence.									Orders 3, 4, 5, and 6.													
	Fractures.	Poison.	Burns and Scalds.	Drowning.	Wounds.	Suffocation.	Otherwise.	Total.		Homicide.	Drowning.	Otherwise.	Total.		Cause not reported.		Total for Class V.			Males.	Females.	Sex not Stated.	Total.
								M.	F.	M.			M.	F.	M.	F.	Males.	Females.	Total.				
Tolland	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1	...	2	...	2	8	15	...	23
Andover	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	2	2	2	2	...	4
Bolton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4
Columbia	1	...	1	...	...	...	...	1	1	...	...	...	...	...	...	1	1	2	3	4	7	...	11
Coventry	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	2	2	9	28	...	37
Ellington	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	10	...	20
Hebron	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	6	...	15
Mansfield	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	1	...	1	7	17	...	24
Somers	1	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	2	...	2	9	11	...	20
Stafford	1	...	...	...	...	...	...	1	...	...	2	...	1	1	...	...	2	1	3	17	21	11	49
Union	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	4	...	7
Vernon	...	...	1	1	...	...	4	3	4	1	1	...	1	...	...		5	4	9	44	58	...	102
Willington	...	...	...	...	...	1	1	...	...	1	...	...	...	...	...	...	4	10	14	6	18	...	24
Totals	3	1	2	1	2	1	5	8	6	2	3	1	2	2	2	3	17	21	38	128	201	11	340

Recapitulation of Table 4.

CAUSES OF DEATH.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	TOTAL.	PER CENT. TO TOTAL MORTALITY. 1879.	1878.	1877.
ZYMOTIC DISEASES.												
Order 1, Miasmatic.............	380	418	229	335	118	107	119	45	1751	18.59	22.51	25.49
" 2, Enthetic...............	5	1	3	1	....	1	....	....	11	.11	.22	.19
" 3, Dietic.................	9	12	4	6	....	4	1	3	39	.41	.37	.46
Total, Class I.............	394	431	236	342	118	112	120	48	1801	19.13	23.10	26.14
CONSTITUTIONAL DISEASES.												
Order 1, Diathetic.............	61	71	55	82	21	47	36	14	387	4.11	4.49	4.34
" 2, Tubercular............	287	388	192	231	103	94	91	62	1448	15.16	15.90	17.03
Total, Class II............	348	459	247	313	124	141	127	76	1835	19.49	20.39	21.37
LOCAL DISEASES.												
Order 1, Nervous System........	255	325	183	197	73	111	76	31	1251	13.29	13.09	12.75
" 2, Organs of Circulation...	108	99	67	80	41	39	39	13	486	5.16	4.87	4.92
" 3, Organs of Respiration...	181	274	97	160	82	79	52	46	971	10.31	7.34	8.78
" 4, Organs of Digestion....	89	131	53	70	39	43	33	26	484	5.14	3.67	4.24
" 5, Urinary Organs........	59	62	33	32	13	22	14	7	242	2.50	2.28	2.05
" 6, Generative Organs.....	5	14	5	8	2	1	2	2	39	.41	.22	.39
" 7, Organs of Locomotion..	....	10	4	3	....	1	....	1	19	.20	.12	.32
" 8, Integumentary System..	3	10	3	3	1	1	1	3	25	.26	.24	.54
Total, Class III...........	700	925	445	553	251	296	217	127	3516	37.34	31.83	33.98
DEVELOPMENTAL DISEASES.												
Order 1, Of Children...........	96	229	69	71	64	27	20	27	603	6.40	5.77	6.07
" 2, Of Women..........	15	12	3	16	7	2	5	4	64	.68	.64	.81
" 3, Of Old People.........	91	95	94	100	35	54	36	18	524	5.56	5.78	3.23
" 4, Of Nutrition...........	12	53	27	31	4	5	12	1	145	1.54	1.36	2.41
Total, Class IV............	214	389	193	218	110	88	73	51	1336	14.15	13.55	14.52
VIOLENT DEATHS.												
Order 1, Accident.............	78	75	36	48	19	17	21	14	307	3.26	3.76	3.10
" 3, Homicide..............	1	2		1		1	....	2	7	.07	.13	.11
" 4, Suicide...............	10	16	5	15	7	7	2	4	66	.70	.61	.57
" 5, Execution.............	....	....	....	1	....	....	....	....	1	.01	......	......
Sudden, Cause unascertained....	5	7	2	14	1	1	3	....	33	.35	.37	.21
Sex and Cause not stated........	104	70	105	64	89	23	20	16	512	5.43	6.27	......
Total, Class V.............	198	170	148	143	116	49	46	36	926	9 83	11.13	......
Grand Total.............	1854	2372	1269	1569	719	687	584	340	9394	100.00	100.00	100.00

TABLE 5.

DEATHS IN TOWNS. ALPHABETICAL ARRANGEMENT, DISTINGUISHED BY NATIONALITY, AGE, AND SEASON.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Connecticut.	All Other States.	Birthplace, Ireland.	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Fall.	Deaths in Winter.	Total.
Andover	..	..	..	..	..	..	..	1	1	2	..	..	..	..	4	..	..	..	..	..	..	..	1	1	..	2	4
Ashford	1	2	3	..	4	2	2	1	5	2	..	..	..	..	18	3	1	..	..	..	..	..	4	4	9	5	22
Avon	2	..	..	1	..	1	..	1	1	4	5	..	..	..	14	..	..	1	..	..	..	..	4	1	3	7	15
Barkhamstead	..	1	1	..	..	..	..	1	5	4	3	..	..	..	13	1	..	..	1	..	..	..	7	1	3	4	15
Beacon Falls	1	3	..	..	1	1	1	1	..	..	..	..	..	..	4	1	1	1	..	..	1	..	3	1	1	3	8
Berlin	8	7	2	4	..	1	2	2	4	4	2	7	..	..	35	5	3	..	..	..	..	..	17	5	10	11	43
Bethany	2	..	..	..	..	..	1	..	3	2	..	2	..	..	10	..	..	..	..	..	..	..	2	2	2	4	10
Bethel	7	1	1	1	1	7	4	3	2	2	3	1	..	..	26	5	2	..	..	..	..	..	7	5	13	8	33
Bethlehem	1	..	..	..	1	..	..	1	2	3	1	1	..	..	9	1	..	..	..	..	..	..	3	2	4	1	10
Bloomfield	3	..	..	1	1	..	..	..	6	2	2	..	..	..	11	1	..	..	..	..	..	3	3	2	6	4	15
Bolton	..	1	..	..	..	..	..	..	1	2	..	..	..	..	3	1	..	..	..	..	..	..	..	1	2	1	4
Bozrah	1	..	1	..	1	2	..	3	..	4	3	..	..	..	13	1	..	1	..	..	..	..	4	3	7	1	15
Branford	6	5	2	3	2	5	4	5	7	8	4	..	..	..	34	4	11	1	1	..	..	..	10	21	8	12	51
Bridgeport	98	86	33	16	36	39	36	18	43	27	16	4	..	..	292	64	59	16	6	..	..	15	82	139	129	102	452
Bridgewater	1	..	..	..	..	..	..	2	..	2	1	..	..	..	6	..	..	..	..	..	..	..	2	3	..	1	6
Bristol	4	5	2	6	9	7	2	8	9	10	6	3	..	..	56	3	12	..	..	..	..	..	17	15	16	23	71
Brookfield	2	..	..	1	..	..	..	..	3	7	1	..	..	..	12	2	..	..	..	..	..	..	4	6	2	2	14
Brooklyn	15	1	1	1	1	2	..	..	1	2	2	2	..	..	26	1	..	..	..	..	1	..	7	10	6	5	28
Burlington	1	3	1	..	1	1	1	..	..	1	..	2	..	..	8	..	..	2	..	..	..	1	4	4	..	3	11
Canaan	2	2	..	1	..	..	2	..	6	4	..	..	..	..	..	..	..	..	..	..	..	17	3	3	6	5	17
Canterbury	1	..	1	..	3	1	1	..	2	1	4	..	..	..	9	2	2	..	..	..	..	1	5	2	3	4	14
Canton	10	10	2	1	1	3	5	6	7	4	2	..	..	..	41	4	4	..	1	..	1	..	9	10	17	15	51
Chapin	2	1	..	..	1	..	..	1	3	..	2	1	..	..	11	..	..	..	..	..	..	..	5	2	2	2	11
Chatham	1	..	..	1	1	1	3	2	3	2	4	2	2	1	19	3	1	..	..	..	..	..	4	3	8	8	23
Cheshire	2	2	1	1	3	2	1	1	5	8	9	1	..	..	27	2	3	..	3	..	1	..	7	9	15	5	36
Chester	1	3	..	..	2	..	4	4	1	4	1	2	..	..	15	5	2	..	..	..	..	..	6	2	6	8	22
Clinton	4	2	..	..	4	3	4	2	8	10	5	..	..	..	32	..	..	..	..	..	1	9	14	13	7	8	42
Colchester	..	3	4	5	8	4	3	7	6	2	2	..	..	..	31	3	6	..	..	..	..	4	17	8	7	12	44
Colebrook	5	..	..	1	3	2	1	3	2	3	3	1	..	..	8	2	..	..	3	..	..	11	8	6	3	7	24
Columbia	..	..	..	..	1	1	2	..	3	1	3	..	..	..	7	2	..	..	1	..	..	1	1	2	3	5	11
Cornwall	1	1	..	2	1	1	..	1	2	2	1	..	..	..	10	2	..	..	..	..	..	..	4	..	4	4	12
Coventry	4	3	2	1	4	3	2	4	7	6	..	1	..	..	27	7	2	1	..	..	..	..	10	6	6	15	37
Cromwell	1	6	1	..	1	..	1	2	3	3	..	2	..	..	14	2	2	2	..	..	..	..	1	9	7	3	20
Danbury	38	13	5	10	11	16	11	16	14	23	11	4	1	..	115	18	14	2	4	..	..	20	38	45	50	40	173
Darien	3	..	1	..	..	1	..	3	2	5	3	..	..	..	9	3	1	..	..	..	..	5	5	2	5	6	18
Derby	47	11	6	9	12	11	13	7	13	10	4	..	..	1	110	9	19	1	4	..	1	2	46	35	26	39	146
Durham	2	1	..	..	1	2	..	2	..	5	3	1	..	..	15	1	1	..	..	..	..	..	4	5	4	4	17
Eastford	1	1	1	1	2	..	2	2	..	4	..	..	..	..	9	5	..	..	..	..	..	..	3	..	5	6	14
East Granby	..	..	..	2	..	..	..	..	..	2	1	1	..	..	6	..	..	..	..	..	..	..	1	1	3	1	6
East Haddam	..	13	1	3	4	1	5	3	4	7	..	1	..	..	39	..	3	..	..	..	..	..	2	20	14	6	42
East Hartford	11	12	1	1	5	7	6	4	4	10	8	1	..	..	51	5	2	..	1	..	1	10	21	21	12	16	70
East Haven	5	4	1	2	1	2	1	1	2	4	1	2	..	..	23	1	1	1	..	..	..	..	8	10	4	4	26
East Lyme	8	1	3	3	1	2	4	1	5	9	4	..	..	1	30	..	..	9	3	..	..	..	19	12	7	4	42
Easton	1	..	..	..	..	..	1	..	4	6	3	1	..	..	15	..	..	..	..	..	..	1	1	8	1	6	16

TABLE 5.—CONTINUED.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Connecticut.	All other States.	Ireland.	Germany.	England.	Sweden.	Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Fall.	Deaths in Winter.	TOTAL.
East Windsor	6	4	1	6	2	2	3	3	5	6	1	...	...	...	22	5	7	2	1	...	...	2	11	6	5	17	39
Ellington	6	1	...	1	...	1	1	1	5	4	...	...	...	...	18	...	2	...	...	...	...	...	6	4	5	5	20
Enfield	18	13	6	9	10	11	9	12	16	12	3	...	...	...	18	1	30	1	1	...	68	...	38	35	20	26	119
Essex	1	2	...	4	...	4	2	2	4	6	3	...	...	...	25	2	1	...	...	...	...	...	5	8	6	9	28
Fairfield	9	...	10	2	1	3	...	8	7	7	4	...	...	...	35	9	7	...	...	...	...	...	18	8	10	15	51
Farmington	2	5	1	1	1	3	...	5	3	7	6	1	...	...	21	1	2	1	2	...	...	8	6	12	10	7	35
Franklin	1	1	...	...	...	...	...	...	1	3	3	...	...	...	8	1	...	...	...	...	...	...	2	1	2	4	9
Glastonbury	7	3	...	...	1	3	2	2	2	5	4	...	...	...	24	2	1	1	1	...	...	...	10	6	6	7	29
Goshen	1	1	...	1	1	...	1	1	3	5	3	...	...	...	12	...	5	...	...	...	...	...	5	...	7	5	17
Granby	1	...	1	2	4	1	...	2	3	1	1	...	...	...	14	1	1	...	...	...	...	...	5	2	5	4	16
Greenwich	11	12	4	7	7	5	3	6	6	15	6	3	1	...	50	14	11	1	1	...	1	8	21	22	22	21	86
Griswold	2	9	4	3	3	2	1	1	2	...	4	...	...	...	20	6	3	...	...	...	...	2	1	11	15	4	31
Groton	16	12	2	4	5	5	4	6	5	12	12	...	...	1	69	11	3	1	...	...	...	...	25	20	24	15	84
Guilford	...	...	...	2	3	3	3	7	7	7	7	...	...	...	26	4	2	...	1	...	...	...	5	18	5	5	33
Haddam	7	2	...	...	...	...	3	3	7	2	3	...	...	...	26	1	...	...	...	...	...	...	6	...	11	10	27
Hamden	4	4	1	2	1	2	1	3	2	5	3	2	...	...	25	...	2	1	1	...	1	...	5	4	4	17	30
Hampton	1	1	2	1	1	1	...	1	1	...	1	...	...	...	7	2	1	...	...	...	...	...	5	...	1	4	10
Hartford	159	55	21	29	65	57	69	74	73	56	21	18	1	15	435	88	129	25	18	4	9	5	163	196	163	191	713
Hartland	...	...	...	1	1	...	...	...	1	2	...	...	...	...	3	2	...	...	...	...	...	...	1	3	...	1	5
Harwinton	2	3	...	1	...	...	...	1	1	2	5	1	...	...	16	...	...	...	...	...	...	...	3	3	3	7	16
Hebron	1	...	1	...	1	...	1	2	4	2	3	...	...	...	12	2	1	...	...	...	...	...	1	5	3	6	15
Huntington	2	1	...	1	4	2	7	2	3	5	2	3	...	...	21	5	3	3	...	...	...	...	7	8	8	9	32
Kent	1	...	...	1	3	...	1	1	1	...	...	...	...	...	6	1	...	1	...	...	...	...	3	1	1	3	8
Killingly.	...	...	...	...	...	...	...	...	...	...	...	...	...	129	87	25	2	...	3	...	12	...	32	37	24	36	129
Killingworth	1	1	3	...	3	1	2	2	1	5	5	...	...	...	24	...	...	...	...	...	...	...	2	5	10	7	24
Lebanon	4	...	...	2	3	1	2	...	1	6	5	...	...	...	19	3	1	1	...	...	...	...	5	6	9	4	24
Ledyard	2	2	...	...	6	1	...	2	6	3	6	...	...	...	26	1	...	1	...	...	...	...	5	5	9	9	28
Lisbon	2	1	...	...	1	...	...	3	1	...	...	...	...	...	6	1	...	...	...	...	...	1	4	1	...	3	8
Litchfield	8	1	2	1	3	2	2	5	1	4	3	1	...	...	23	1	3	...	...	...	...	6	7	7	7	12	33
Lyme	5	...	...	1	...	...	1	...	3	2	...	...	...	...	12	...	...	...	...	...	...	...	1	3	5	3	12
Madison	1	...	...	1	3	2	1	3	3	7	4	1	...	...	22	3	1	...	...	...	...	...	10	7	3	6	26
Manchester	15	13	...	1	12	6	3	11	8	6	5	1	...	...	61	7	13	2	5	...	1	2	24	22	26	19	91
Mansfield	4	2	1	3	1	2	...	2	3	5	1	...	...	...	22	1	1	...	...	...	...	...	10	6	3	6	24
Marlborough	...	...	...	...	...	...	...	3	2	3	2	...	...	...	9	1	...	...	...	...	...	...	3	2	2	3	10
Meriden	59	50	14	11	22	18	15	15	10	11	5	1	...	66	211	15	23	7	9	...	5	27	65	61	57	48	297
Middlebury	...	...	1	...	...	...	...	...	3	4	2	...	...	...	10	...	...	...	...	...	...	...	3	2	1	4	10
Middlefield	...	1	1	1	...	2	1	3	...	1	...	...	...	...	8	1	1	...	...	...	...	...	3	3	1	3	10
Middletown	32	22	6	9	16	17	13	13	22	28	11	2	...	1	128	18	27	3	8	...	...	8	57	44	43	48	192
Milford	9	4	3	2	7	4	5	1	6	9	6	...	...	...	50	4	1	...	...	...	1	...	12	12	13	19	56
Monroe	...	...	1	...	...	...	2	...	...	1	2	2	...	...	8	...	...	...	...	...	...	...	...	1	4	3	8
Montville	4	3	...	2	2	1	3	3	2	5	7	1	...	2	33	...	2	...	...	...	...	...	6	5	13	11	35
Morris	...	...	...	1	4	2	2	1	4	1	1	1	...	...	12	4	1	...	...	...	...	...	4	5	4	4	17
Naugatuck	9	5	2	3	4	5	2	2	8	3	3	1	...	...	37	...	7	3	...	...	...	...	16	5	7	19	47
New Britain	37	22	6	10	17	5	10	8	13	20	5	2	...	20	103	13	16	8	9	...	1	25	34	44	38	59	175
New Canaan	5	2	1	1	3	3	2	1	2	9	2	...	...	1	18	11	...	...	...	...	3	...	9	6	5	12	32
New Fairfield	...	2	2	1	2	2	...	1	...	2	3	...	...	...	13	...	2	...	...	...	...	...	4	4	2	5	15
New Hartford	9	3	1	3	6	2	4	4	7	6	6	...	...	...	35	3	8	...	...	...	...	5	13	11	9	18	51
New Haven	292	125	34	51	88	88	83	87	89	77	42	4	2	...	643	114	193	37	8	...	21	16	251	289	241	281	1062
Newington	4	1	...	...	...	...	1	...	4	2	2	1	...	...	11	2	...	1	...	...	1	...	5	4	3	3	15

TABLE 5.—CONTINUED.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Connecticut.	All other States.	Ireland.	Germany.	England.	Sweden.	Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Fall.	Deaths in Winter.	TOTAL.
New London	46	30	14	10	20	9	20	22	20	23	27	9	1	..	158	48	28	..	5	..	..	..	49	67	61	74	251
New Milford	7	4	2	..	3	7	3	5	10	11	4	2	..	..	29	4	7	..	1	..	..	18	20	18	12	9	59
Newtown	9	1	2	7	10	1	8	6	2	7	4	..	..	..	42	4	2	..	..	..	2	7	17	17	8	15	57
Norfolk	3	..	2	3	2	2	..	6	3	3	..	..	..	..	15	3	2	..	1	..	..	..	8	9	4	3	24
North Branford	1	2	1	..	..	2	2	..	1	4	4	..	..	..	17	..	..	..	..	..	..	..	6	1	2	8	17
North Canaan	1	..	1	4	2	1	..	2	3	4	1	..	1	..	..	..	..	..	..	..	..	20	5	5	6	4	20
North Haven	2	..	..	2	1	2	1	3	5	3	..	2	..	..	19	1	1	..	..	..	..	..	6	8	3	4	21
North Stonington	5	4	4	5	1	..	3	2	2	8	1	..	..	..	30	5	..	..	..	..	..	..	18	5	3	9	35
Norwalk	30	29	10	14	15	24	19	14	19	28	14	3	..	11	146	42	30	4	6	..	1	1	57	56	45	72	230
Norwich	88	52	9	22	29	28	18	34	35	33	25	3	1	1	253	27	60	7	11	..	15	5	105	90	78	105	378
Old Lyme	1	2	..	2	1	3	..	..	..	3	5	1	..	1	19	..	..	..	..	..	..	..	7	4	5	3	19
Old Saybrook	1	3	2	2	1	1	3	1	1	3	4	..	..	..	19	2	1	..	..	..	..	..	12	3	3	5	22
Orange	8	1	2	3	1	3	2	2	4	7	4	2	..	1	31	4	1	1	1	..	2	..	11	19	6	4	40
Oxford	5	..	1	..	1	2	3	..	4	1	7	2	..	1	25	..	1	..	..	..	..	1	10	6	6	5	27
Plainfield	15	5	.	4	11	3	3	4	5	11	2	..	..	..	42	10	1	..	2	..	8	..	15	14	16	18	63
Plainville	1	2	2	..	3	1	..	2	1	..	2	..	..	..	12	..	2	..	..	..	..	..	8	2	3	1	14
Plymouth	3	..	2	2	1	3	3	2	1	4	..	..	..	..	17	..	2	2	..	..	..	..	9	4	2	6	21
Pomfret	3	3	..	3	..	1	1	4	2	9	1	1	..	..	22	4	2	..	..	..	..	..	9	8	6	5	28
Portland	23	12	8	2	10	5	4	10	8	6	1	..	..	..	66	1	18	..	..	..	..	..	20	22	17	29	89
Preston	5	3	2	2	3	..	2	3	5	2	6	1	..	..	20	4	..	..	1	3	..	10	11	5	7	11	34
Prospect	1	..	..	1	..	1	2	..	5	1	1	..	..	..	10	2	..	..	..	..	..	..	3	2	3	4	12
Putnam	34	8	3	14	12	7	2	6	5	2	6	2	..	..	63	8	4	..	1	..	16	9	27	23	21	30	101
Redding	2	2	1	1	3	1	3	3	1	4	5	..	..	..	23	2	1	..	..	..	..	..	8	4	6	8	26
Ridgefield	4	..	1	..	2	3	1	3	2	7	7	..	..	..	26	3	..	..	1	..	..	..	7	5	9	9	30
Rocky Hill	.	2	..	..	2	1	..	1	1	1	4	..	..	..	9	..	3	..	..	..	..	..	3	2	3	4	12
Roxbury	2	1	..	..	4	..	..	..	2	—	1	..	..	..	8	1	..	..	1	..	..	..	1	1	3	5	10
Salem	..	2	1	1	2	2	..	2	1	6	3	1	..	..	19	1	..	..	..	..	..	1	8	1	3	9	21
Salisbury	15	3	1	1	2	6	5	6	6	7	7	..	..	..	36	8	7	..	..	..	..	8	15	15	11	18	59
Saybrook	..	3	..	2	1	..	1	2	2	1	..	..	..	..	8	1	1	1	..	..	1	..	3	1	6	2	12
Scotland	1	..	..	1	..	..	1	..	..	4	..	..	..	..	6	..	..	..	..	..	..	1	2	2	3	..	7
Seymour	9	2	..	..	5	1	..	8	2	5	..	..	..	..	25	4	.	..	..	..	..	3	8	8	6	1	32
Sharon	1	5	..	1	1	2	2	7	2	3	..	..	..	..	18	4	..	..	..	..	..	2	8	3	6	7	24
Sherman	2	2	..	1	4	2	..	5	..	3	2	..	..	..	13	8	..	..	..	..	..	..	3	3	7	8	21
Simsbury	6	..	..	2	4	..	2	1	7	10	4	..	..	..	25	5	5	..	1	..	..	..	11	7	6	12	36
Somers	1	1	2	1	2	2	1	1	1	7	1	..	..	..	18	1	1	..	..	..	..	..	8	5	4	3	20
Southbury	..	..	1	..	2	1	2	2	2	1	4	..	..	..	15	..	..	..	..	..	..	..	4	3	2	6	15
Southington	14	14	3	6	3	8	6	3	4	6	6	2	..	1	54	4	8	2	3	..	..	5	21	14	14	27	76
South Windsor	4	..	..	..	3	1	1	..	1	4	3	..	..	..	16	..	1	..	..	..	..	..	7	5	2	3	17
Sprague	19	8	1	1	6	3	1	3	2	6	4	1	..	..	37	3	5	..	3	..	6	1	17	6	17	15	55
Stafford	6	3	2	3	7	7	1	3	8	3	4	..	1	1	30	12	4	..	2	.	1	..	10	12	11	16	49
Stamford	30	6	14	12	9	12	11	11	13	19	10	6	..	1	93	29	23	2	3	..	4	..	49	39	21	45	154
Sterling	1	..	..	..	..	1	2	3	2	2	1	..	..	..	7	5	..	..	..	..	..	..	3	1	6	2	12
Stonington	11	16	6	11	13	7	9	5	8	14	15	3	1	2	77	22	16	4	..	..	2	..	33	37	26	25	121
Stratford	3	4	2	1	5	4	..	1	3	4	7	..	..	..	21	8	3	..	2	..	..	..	8	16	5	5	34
Suffield	4	..	2	1	3	2	4	..	8	8	5	..	..	2	32	3	1	1	2	..	..	..	8	7	12	12	39
Thompson	31	19	6	9	5	3	4	5	1	9	5	1	..	..	70	8	3	..	..	..	17	..	27	15	27	29	98

TABLE 5.—CONTINUED.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Connecticut.	All Other States.	Birthplace, Ireland.	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Fall.	Deaths in Winter.	Total.
Thomaston	8	5	...	2	2	5	1	...	1	1	1	...	...	...	22	1	1	2	...	...	...	...	4	9	7	6	26
Tolland	1	1	...	...	...	2	3	3	8	2	...	...	...	3	21	...	1	1	...	...	...	...	7	8	4	4	23
Torrington	1	5	...	2	...	3	4	5	8	9	4	...	...	1	27	5	5	...	4	...	1	...	9	10	14	9	42
Trumbull	2	...	1	1	2	...	1	2	2	2	4	...	...	...	16	...	1	...	...	...	...	...	3	4	5	5	17
Union	1	...	1	1	1	1	...	...	1	1	...	...	...	...	3	3	...	...	...	...	1	...	1	4	1	1	7
Vernon	32	8	6	7	10	6	8	8	8	6	3	...	...	...	63	10	14	9	4	...	...	2	30	29	25	18	102
Voluntown	3	2	...	1	1	...	2	1	3	1	...	...	...	...	...	...	...	...	...	...	...	14	2	3	6	3	14
Wallingford	17	2	4	3	5	3	2	3	7	6	8	1	...	...	51	1	4	2	1	...	2	...	17	18	14	12	61
Warren	1	...	...	...	...	...	...	2	2	2	...	...	...	...	5	...	1	1	...	...	...	...	3	3	...	1	7
Washington	4	2	...	2	...	4	2	3	8	7	2	...	...	...	32	...	1	1	...	...	...	...	15	11	4	4	34
Waterbury	90	24	26	18	31	26	10	21	20	16	7	1	1	...	189	23	51	3	10	...	6	9	81	65	79	66	291
Waterford	3	4	...	...	1	...	2	4	2	4	3	...	...	...	23	...	...	...	...	...	...	...	8	4	4	7	23
Watertown	10	...	...	...	2	6	1	1	...	6	1	...	...	...	24	...	...	...	...	...	...	3	6	8	7	6	27
Westbrook	...	...	...	1	...	...	...	1	2	4	5	...	...	1	14	...	...	...	...	...	...	...	4	3	5	2	14
West Hartford	5	1	...	2	1	...	1	3	4	2	1	...	...	...	16	3	1	...	...	...	...	...	6	4	3	7	20
Weston	1	...	1	1	1	...	...	1	3	2	1	3	...	...	13	1	...	...	...	...	...	...	4	4	4	2	14
Westport	10	6	1	2	7	5	4	4	3	6	5	2	...	...	44	3	5	1	2	...	...	...	16	12	15	12	55
Wethersfield	3	2	...	1	8	4	1	3	7	6	5	2	...	...	33	4	3	...	1	...	...	1	11	14	8	9	42
Willington	6	...	1	1	3	...	1	2	2	2	5	1	...	...	19	2	...	3	...	...	...	...	6	10	5	3	24
Wilton	...	...	...	...	2	3	2	4	4	1	5	...	...	...	18	...	2	...	...	...	1	...	6	6	3	6	21
Winchester	2	5	8	4	6	5	9	3	10	9	9	4	...	...	58	7	7	...	2	...	...	...	28	14	12	20	74
Windham	41	10	7	6	17	11	10	11	14	11	9	...	...	3	105	18	12	...	...	...	10	5	47	45	35	23	150
Windsor	2	2	4	8	4	4	8	4	6	9	2	...	...	...	38	5	7	...	1	...	1	1	17	11	9	16	53
Windsor Locks	5	1	1	1	1	1	...	1	4	1	...	...	...	...	13	1	2	...	...	...	...	...	5	2	4	5	16
Wolcott	...	...	1	...	...	1	1	...	2	1	1	...	...	...	5	...	2	...	...	...	...	...	2	2	2	1	7
Woodbridge	...	...	1	...	2	...	2	...	...	5	1	...	...	...	11	...	...	...	...	...	...	...	2	4	4	1	11
Woodbury	5	2	...	1	2	1	2	4	5	11	1	...	...	...	32	...	...	...	2	...	...	...	11	6	10	8	34
Woodstock	1	...	...	1	3	1	1	1	4	2	4	...	...	...	12	4	...	...	...	...	...	2	4	3	6	5	18
Totals	1761	919	401	482	782	667	612	731	904	1048	661	145	13	268	6524	958	1006	175	171	7	228	345	2608	2301	2095	2990	9394

RECAPITULATION OF TABLE 5.

AGES.

		Per cent. to Total Mortality.
Deaths under 1 year, - - - - - - - -	1,761	18.7
Deaths from 1 to 5, - - - - - - - -	919	9.6
Total, First Period, Infantile, - - -	2,680	28.3
Deaths from 5 to 10, - - - - - -	401	4.2
Deaths from 10 to 20, - - - - - -	482	5.2
Total, Second Period, Youth, - - -	883	9.4
Deaths from 20 to 30, - - - - - -	782	8.5
" " 30 to 40, - - - - - -	667	7.5
" " 40 to 50, - - - - - -	612	7.2
" " 50 to 60, - - - - - -	731	8.0
Total, Third Period, the Productive Age, -	2,792	31.6
Deaths from 60 to 70, - - - - - -	904	9.0
" " 70 to 80, - - - - - -	1,048	9.7
" " 80 to 90, - - - - - -	661	8.3
" " 90 to 100, - . - - - -	145	1.6
" over 100, - - - - - - -	13	.1
Total, Fourth Period, Old Age, - - -	2,771	28.7
Age not stated, - - - - - - -	268	2.0
Total, - - - - - - - - -	9,394	100.00

NATIONALITIES.

Deaths of those born in Connecticut, - -	6,524	69.8
" " " in all other States, - -	958	9.9
Total for United States, - - - - -	7,482	79.7
Deaths of those born in Ireland, - - -	1,006	9.9
" " " in Germany, - - -	175	3.2
" " " in England, - - -	171	3.1
" " " in Sweden, - - -	7	.1
" " " in all other foreign countries,	345	4.0
Total Foreign Births, - - - - -	1,912	20.3
Total, - - - - - - - - -	9,394	100.00

SEASON.

Deaths in Spring, - - - - - - -	2,208	23.5
" in Summer, - - - - - - -	2,301	24.0
" in Autumn, - - - - - - -	2,095	20.0
" in Winter, - - - - - - -	2,790	32.5
Total, - - - - - - - - -	9,394	100.00

BIRTHS.

Births in Spring, - - - - - - -	3,396	24.3
" in Summer, - - - - - - -	3,500	25.6
" in Autumn, - - - - - - -	3,458	24.3
" in Winter, - - - - - - -	3,597	25.8
Total, - - - - - - - -	14,051	100.00

TABLE VI.

CAUSES OF DEATHS, BY MONTHS, AGE, AND SEX.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	DISEASE.	Under 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Male.	Female.	Sex not stated.	Total.
						1							Arthritis							1							1			1
		2	3	2			2	1					Abscess	1		1		2	3	2	1						4	6		10
2	7	4	6	3	10	6	15	3	6	4	2		Accident	1	3	1	4	11	5	8	9	10	11	4	1		43	25		68
	1	1	2	3	1		1	1	2	1			Aneurism							2	4	3	4				8	5		13
1		2			1	1							Angina Pectoris								2	2	1				4	1		5
36	27	24	23	15	20	21	22	17	28	21	16		Apoplexy				1	5	8	18	40	58	90	47	3		135	135		270
1		1		1			1	1		1			Ascites									3	1	2			2	4		6
5	2	2	3		1		2	1	3	2			Asthma	3		1		4	5	2			3	1	1	1	12	9		21
									1				Addison's Disease						1								1			1
6	8	10	5	6	6	5	8	3	2	7	8		Bronchitis				2	4	5	5	9	14	18	12	4	1		45	29	74
10	6	7	6	2		3		3	4	9	12		Bronchitis, Capillary	46	14	2												37	25	62
18	20	20	15	15	29	26	19	5	9	21	14		Brain Disease	41	42	5	11	7	14	12	16	20	30	10	3			116	95	211
13	3	14	4	10	4	10	8	14	10	3	10		Bright's Disease			1	4	10	11	14	22	24	15	2			68	35		103
3	4	4	2	3		1	1	1	2	3	4		Burns and Scalds	1	16	3	1		1			3	1	2			15	13		28
2	1		1										Caries and Necrosis					2			1	1					2	2		4
24	7	20	14	15	14	25	24	20	10	16	20		Cancer						6	20	30	45	48	40	20		60	149		209
	2					2			1				Carbuncle						1		1	3					3	2		5
		1		2	1	2				1	1		Calculus and Gravel							4	2	2					8			8
6	4	5	4	4	9	6	8	4	4	2	3		Cerebro-Spinal Meningitis	8	17	5	9	2		4	7	4	1	1	1		32	27		59
8	5	8	8	2	6	2	5	4	6	6	4		Childbirth					30	24	10								64		64
1	1	2	2	5	27	124	134	40	16				Cholera Infantum	291	60												197	154		351
				1									Chorea					1									1			1
132	121	146	136	112	90	100	105	102	93	90	80		Consumption	25	28	16	142	302	270	185	125	112	72	30			554	753		1307
2	1	1						1	3				Colic	3	1				3	1			2				6	2		8
19	20	32	15	16	18	28	30	20	23	20	15		Convulsions	140	78	14	5	6		2	3	5	2	1			120	136		256
22	13	16	13	5	4	7	8	8	19	15	19		Croup	47	86	16											80	69		149
2			1	2	3	1	2	2		1	2		Cyanosis	16													10	6		16

1	2	1	1	1	3	3	6	....	3	1	1	..	Cystitis	....	....	..	..	....	2	4	1	6	10	..	..	..	16	7	..	23
....	....	1	....	....	..	....	....	....	..	..	..	..	Chicken Pox	....	1	..	..	....	....	....	....	....	..	..	..	..	1	....	..	1
4	7	10	18	10	15	8	11	9	8	7	4	..	Debility and Atrophy	39	3	..	3	4	4	6	5	18	19	10	..	..	60	51	..	111
3	3	4	5	4	..	....	2	3	2	3	..	..	Diabetes	....	....	..	3	4	2	4	5	3	4	4	..	..	17	12	..	29
1	2	3	1	3	2	9	25	14	16	6	4	..	Diarrhœa	18	5	3	1	....	4	8	10	8	10	7	12	..	44	42	..	86
36	20	22	19	16	11	10	11	21	48	18	24	..	Diphtheria	26	120	68	32	5	4	....	....	....	..	1	..	..	112	144	..	256
20	7	12	12	16	10	8	13	14	12	16	10	4	Dropsy and Anæmia	6	6	2	3	1	8	10	22	52	34	10	..	..	70	84	..	154
....	1	4	5	4	10	6	11	5	4	1	4	..	Drowning	3	7	6	12	9	6	5	2	2	3	..	..	..	36	19	..	55
3	....	3	2	....	2	7	27	13	12	6	..	..	Dysentery	10	12	1	2	1	2	8	10	8	14	5	2	..	43	32	..	75
1	1	....	....	....	1	1	1	....	..	..	..	..	Embolism	....	....	..	..	1	....	2	1	1	..	..	..	..	4	1	..	5
5	3	2	4	3	6	5	10	8	6	6	2	..	Enteritis	16	12	2	4	3	8	4	2	4	5	..	..	..	31	29	..	60
2	4	3	2	3	2	1	4	1	2	3	2	..	Epilepsy	1	1	7	2	3	4	6	4	1	..	..	..	..	10	19	..	29
....	....	....	....	....	..	....	....	....	..	..	..	..	Epistaxis	....	....	..	..	....	....	....	....	....	..	..	..	..	....	....	..	....
8	4	10	3	5	8	1	2	2	1	2	3	..	Erysipelas	2	4	2	3	6	4	4	6	8	6	4	..	..	19	30	..	49
....	....	....	....	....	..	....	....	....	..	..	..	..	Exposure	....	....	..	..	....	....	....	....	....	..	..	..	..	....	....	..	....
1	....	1	3	4	2	4	2	2	..	..	2	..	Fever, Congestive	....	1	..	1	3	3	3	....	5	4	1	..	..	12	9	..	21
2	2	....	3	2	4	5	6	1	5	4	1	..	Fever, Intermittent	2	1	2	3	5	3	4	1	3	5	4	2	..	15	20	..	35
2	2	....	5	....	2	1	2	5	2	2	2	..	Fever, Remittent	....	....	6	5	2	....	6	3	1	2	..	..	..	12	13	..	25
15	10	10	12	11	4	4	17	26	17	15	18	..	Fever, Typhoid	14	18	10	36	30	8	14	9	9	10	1	..	..	79	80	..	159
....	7	5	5	8	5	8	19	16	30	8	6	..	Fever, Typho-Malarial	4	15	14	12	18	14	10	14	14	1	1	..	..	62	55	..	117
1	....	....	....	....	..	....	....	....	..	1	..	..	Fistula	....	....	..	..	....	1	1	....	....	..	..	..	..	2	....	..	2
8	4	8	6	4	5	4	14	10	6	5	9	..	Fractures and Contusions	3	5	7	10	6	6	6	10	13	12	5	..	..	53	30	..	83
1	....	....	....	....	..	....	....	....	..	..	1	..	Freezing	....	....	..	..	....	....	1	1	....	..	..	..	..	2	....	..	2
....	....	1	....	....	..	....	....	....	..	..	..	..	Glanders	....	....	..	..	....	1	....	....	....	..	..	..	..	1	....	..	1
2	3	2	10	2	6	12	6	8	8	4	10	..	Gastritis	14	4	3	4	6	5	4	6	10	13	3	1	..	33	40	..	73
2	3	1	2	1	1	1	....	1	..	2	..	..	Gangrene	....	....	..	..	....	....	....	1	5	5	2	1	..	9	5	..	14
26	42	42	41	40	32	23	38	25	40	42	48	1	Heart Disease	18	4	9	23	26	28	40	55	112	86	35	4	..	226	214	..	440
....	....	....	....	....	..	1	1	....	..	..	..	..	Heat, Sunstroke	....	....	..	..	....	....	....	....	2	..	..	..	..	2	....	..	2
1	4	2	2	3	3	3	....	....	3	1	..	..	Hemorrhage	4	....	..	..	2	1	2	3	5	3	2	..	..	9	13	..	22
1	2	2	2	....	2	1	2	1	2	5	1	..	Hepatitis	....	....	1	2	4	4	4	4	....	2	..	..	..	13	8	..	21
....	1	3	1	2	1	2	2	4	3	2	1	..	Hernia	....	....	..	..	....	3	6	5	2	..	6	..	..	10	12	..	22
1	....	....	1	2	..	....	2	1	..	..	..	..	Homicide	....	....	..	..	3	2	2	....	....	..	..	..	..	5	2	..	7
5	6	5	5	2	6	12	6	5	7	3	3	..	Hydrocephalus	30	25	6	4	....	....	....	....	....	..	..	..	..	35	30	..	65
1	....	....	....	....	1	....	....	....	..	..	..	..	Hydrophobia	....	....	..	..	....	1	..	....	1	..	..	..	..	2	....	..	2
6	2	8	5	4	3	8	4	4	4	..	2	..	Insanity	....	....	..	2	6	10	14	6	12	..	..	..	..	24	26	..	50

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Males.	Females.	Sex not stated.	Total.
4	3	2	4	3	..	2	5	1	2	1	2	..	Intemperance	....	..	..	..	2	10	8	4	3	2	....	....	....	...	20	9	....	29
....	....	....	..	..	..	2	..	..	..	..	..	..	Intussuception	1	1	..	..	..	....	....	....	....	....	....	....	....	....	1	1	....	2
2	1	1	4	1	2	5	2	..	..	..	..	..	Jaundice	4	2	1	..	..	2	....	3	2	2	1	1	....	....	8	10	....	18
1	....	2	3	..	1	..	..	1	2	1	2	..	Joint Disease	....	1	1	5	1	1	2	2	....	....	....	....	....	....	6	7	....	13
....	....	1	..	..	..	..	..	..	..	..	..	..	Hanging, Execution	....	..	..	..	..	1	....	....	....	....	....	....	....	....	1	....	....	1
3	4	2	6	2	4	6	7	2	2	4	2	..	Kidney Disease	....	..	..	2	4	4	6	5	6	12	5	....	....	....	28	16	....	44
1	2	....	1	..	3	1	2	1	2	3	..	..	Laryngitis	...	7	4	2	..	1	1	....	1	....	....	....	....	....	6	10	....	16
1	....	....	..	..	..	1	..	1	..	..	..	..	Lightning	....	..	..	..	2	1	....	....	....	....	....	....	....	....	2	1	....	3
6	6	8	5	6	13	4	9	7	6	10	2	..	Liver, Disease of	5	1	1	..	2	4	12	13	20	16	8	....	....	....	38	44	....	82
34	18	16	12	6	9	8	5	8	10	13	16	..	Lung, Disease of	30	16	6	11	22	3	15	11	14	13	12	2	....	....	81	74	....	155
2	3	2	..	3	2	3	1	..	2	4	2	..	Malformation	22	1	1	..	..	....	....	....	....	....	....	....	....	....	11	13	....	24
....	....	1	1	1	..	1	1	..	1	..	8	..	Measles	4	7	1	1	1	....	....	....	....	....	....	....	....	....	5	9	....	14
10	7	11	7	14	18	14	15	11	14	3	10	..	Meningitis	32	56	16	12	6	3	3	1	4	1	....	....	....	....	80	54	....	134
....	....	....	..	2	..	1	2	..	2	..	..	..	Mortification	....	..	..	..	2	2	3	....	....	....	....	....	....	....	4	3	....	7
...	....	....	..	..	..	1	1	1	..	..	..	..	Neuralgia	....	..	..	..	..	....	2	1	....	....	....	....	....	....	2	1	....	3
....	....	....	..	..	..	..	..	..	..	..	..	..	Necrosis	....	..	..	..	..	....	....	....	....	....	....	....	....	....	....	....	....	....
....	1	....	2	3	2	..	..	..	3	1	..	..	Nephritis	....	..	..	2	1	3	1	....	3	....	2	....	....	....	10	2	....	12
56	35	48	42	31	21	36	34	30	35	40	30	11	Not Stated	112	46	18	20	30	36	28	26	36	39	31	9	1	17	210	209	30	449
70	50	63	50	34	36	43	32	39	34	30	41	..	Old Age	....	..	..	..	..	....	....	....	14	138	268	90	12	....	224	298	....	522
1	1	2	1	1	1	..	..	..	1	2	..	..	Ovarian Tumor	....	..	..	..	1	....	2	1	6	....	....	....	....	....	....	10	....	10
....	2	1	1	..	..	1	1	..	..	..	..	..	Ovarian Dropsy	...	..	..	..	..	1	....	3	1	1	...	....	....	....	....	6	....	6
1	....	....	..	..	..	..	..	..	..	..	1	..	Phlebitis	....	..	..	..	..	....	1	1	....	....	....	....	....	....	2	....	....	2
20	14	30	18	39	20	23	21	20	20	15	20	4	Paralysis	2	1	4	4	5	13	35	56	85	51	8	...	....	....	124	140	....	264
1	2	2	4	2	4	2	..	..	3	1	7	..	Pericarditis	....	..	1	4	3	2	2	2	3	5	5	1	....	....	13	15	....	28
9	6	8	10	7	4	10	16	10	8	12	6	..	Peritonitis	10	4	3	18	16	11	8	10	11	12	3	....	....	....	48	58	....	106
2	....	....	1	1	2	2	1	3	2	2	1	..	Pleurisy	....	..	..	1	2	1	2	4	2	3	2	....	....	....	8	9	....	17

127	105	107	70	42	26	12	14	14	31	21	57	..	Pneumonia	62	56	24	19	50	38	40	71	104	98	51	7	....	6	332	294	....	626
1	....	....	..	2	1	..	1	2	4	2	2	..	Poison	1	2	1	..	2	2	....	4	2	....	1	....	....	....	7	8	....	15
30	20	30	21	22	11	21	15	10	12	30	20	..	Premat'e Birth & Debility	242	..	..	..	..	....	....	....	....	....	....	....	....	....	140	102	....	242
1	....	1	..	1	..	1	..	..	..	..	..	..	Pyaemia and Septicaemia	....	..	..	..	1	....	....	3	....	....	....	....	....	....	2	2	....	4
2	1	....	..	..	..	..	..	..	..	..	1	..	Privation	....	..	..	..	..	....	....	1	1	1	1	....	....	....	2	2	....	4
....	....	1	..	2	..	..	..	..	..	..	..	..	Prostatitis	....	..	..	..	..	....	....	....	....	....	2	1	....	....	3	....	....	3
6	1	4	4	4	6	..	2	2	2	1	1	..	Puerperal Fever	....	..	..	1	17	12	3	....	....	....	....	....	....	....	....	33	....	33
....	1	....	2	..	..	1	..	..	2	..	..	..	Puerperal Convulsions	....	..	..	1	2	3	....	....	....	....	....	....	....	....	....	6	....	6
....	1	....	..	..	..	..	..	..	..	..	..	..	Puerperal Mania	....	..	..	..	1	....	....	....	....	....	....	....	....	....	....	1	....	1
1	....	....	..	..	..	..	..	..	..	..	..	..	Purpura	....	..	..	..	..	....	1	....	....	....	....	....	....	....	1	....	....	1
1	1	....	..	..	6	1	..	2	2	2	..	..	Railroad Accidents	....	..	..	7	2	1	1	1	1	2	....	....	....	....	10	5	....	15
4	3	2	3	10	4	5	8	4	5	3	3	..	Rheumatism	....	..	3	2	4	3	8	10	7	4	8	5	....	....	30	24	....	54
32	18	20	15	10	15	8	4	6	8	17	11	..	Scarlatina	10	74	50	26	2	2	....	....	....	....	....	....	....	....	86	78	....	164
2	4	2	2	6	3	2	..	..	2	..	..	2	Scrofula	3	1	4	5	2	3	4	1	...	2	....	....	....	....	14	11	....	25
....	....	....	..	1	1	.	1	..	..	1	..	..	Skin Disease	2	..	..	..	..	....	....	....	1	....	1	....	....	....	2	2	....	4
1	....	....	..	..	..	..	..	..	..	..	3	..	Small Pox	....	1	..	..	..	2	1	....	....	....	....	....	....	....	4	....	....	4
1	....	....	..	3	1	..	2	..	2	..	2	..	Spina Bifida	10	1	..	..	..	....	....	....	....	....	....	....	....	....	3	8	....	11
....	....	1	..	..	..	4	1	2	..	..	..	..	Spinal Disease	1	..	..	2	..	....	1	1	2	1	....	....	....	....	5	3	....	8
1	....	....	..	..	1	..	2	..	..	..	..	..	Spleen Disease	....	..	..	..	..	1	2	1	....	....	....	....	....	....	2	2	....	4
2	5	4	1	2	3	4	1	8	5	3	2	..	Stomach Disease	7	..	2	1	2	4	3	8	3	8	2	....	....	....	18	22	....	40
....	....	...	..	..	1	..	..	..	..	..	..	..	Stricture of Oesophagus	....	..	..	..	..	....	....	1	....	....	....	....	....	....	1	....	....	1
....	1	....	2	3	..	..	2	..	..	1	..	..	Stricture of Intestines	...	..	..	..	..	....	4	1	2	2	....	....	....	....	3	6	....	9
1	....	1	..	..	..	..	..	..	..	..	..	..	Stricture of Urethra	....	.	..	..	1	1	....	....	....	....	....	....	....	....	2	....	....	2
30	25	24	30	23	15	30	25	12	22	20	30	..	Stillborn	286	.	..	..	..	....	....	...	....	....	....	....	....	....	154	132	....	286
2	2	3	1	5		..	2	1	2	3	..	..	Sudden	3	4	1	2	2	4	1	2	1	1	....	....	....	....	16	5	....	21
2	....	....	2	3	..	..	..	..	2	..	2	..	Suffocation	7	2	1	..	..	1	....	....	....	....	....	....	....	....	5	6	....	11
1	1	....	..	3	1	..	..	..	..	..	..	..	Suicide	....	..	..	..	..	2	2	2	....	....	....	....	....	....	4	2	....	6
2	....	....	1	..	2	..	..	..	1	..	2	..	Suicide by Wounds	....	..	..	1	1	2	2	2	....	....	....	....	....	....	6	2	....	8
....	1	2	2	..	1	2	..	..	5	1	3	..	Suicide by Poison	....	..	..	2	2	2	4	5	2	...	....	....	....	....	10	7	....	17
....	....	....	..	..	..	2	..	..	3	2	1	..	Suicide by Hanging	....	..	..	..	..	1	4	....	1	2	....	....	....	....	6	2	....	8
1	....	1	1	3	4	4	3	2	..	..	..	..	Suicide by Drowning	....	..	..	..	..	4	5	4	4	2	....	....	....	....	12	7	....	19
....	1	....	1	..	..	..	2	2	..	1	..	..	Syphilis	1	..	..	..	2	2	2	....	....	....	....	....	....	....	5	2	....	7
3	2	4	4	3	6	8	8	8	6	4	5	..	Tabes Mesenterica	40	7	2	1	5	2	2	....	1	1	....	....	....	....	31	30	....	61
....	....	2	4	1	5	4	6	5	2	4	4	..	Teething	20	17	..	..	..	....	....	....	....	....	....	....	....	....	18	19	....	37
1	2	1	2	5	3	2	3	1	3	3	..	..	Tetanus	8	..	2	4	4	4	1	....	2	1	....	....	....	....	16	10	....	26

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Uunder 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Males.	Females.	Sex not stated.	Total.
1	....	1	.	..	1	..	..	..	..	..	1	..	Thrush	4	..	..	..	..	....	....	....	....	....	....	....	....	....	2	2	....	4
1	3	1	1	1	..	..	..	..	..	2	..	..	Ulcer	....	3	..	1	2	....	1	....	2	....	....	....	....	....	5	4	....	9
....	2	3	2	2	3	1	3	2	3	2	2	..	Ulceration of Intestines	....	..	..	..	2	2	6	8	3	3	1	....	....	....	11	14	....	25
4	2	2	..	..	1	2	2	2	1	2	..	..	Uraemia	....	..	..	1	1	4	....	2	2	4	2	2	....	....	13	5	....	18
....	1	1	2	1	..	1	2	1	2	1	2	..	Uterus, Disease of	....	..	..	..	..	2	5	3	4	....	....	....	....	....	....	14	....	14
....	....	....	1	..	..	1	2	1	2	1	1	..	Uterus, Tumor of	....	..	..	..	..	3	2	4	....	....	....	....	....	....	....	9	....	9
1	....	1	..	1	..	2	..	1	.	..	..	..	Violence	....	..	..	2	1	....	3	....	....	....	....	....	....	....	4	2	....	6
10	6	4	3	6	4	10	4	10	4	7	6	..	Whooping Cough	40	30	3	..	1	....	....	....	....	....	....	....	....	....	34	40	....	74
...	....	3	1	..	..	2	3	3	4	5	1	..	Wounds	....	..	4	5	..	6	1	2	....	4	....	....	....	....	14	8	....	22

BIRTHS.

The total number of births reported was 14,051, an excess of 552 over the preceding year. The returns are in many instances more complete than during any previous year, due for the most part to the efforts of the registrars, although the returns from physicians are also better, and indicate that more attention is paid to the law. The importance of securing the name of the child for registration cannót be too often impressed upon all those engaged in the execution of the law, and both physicians and registrars are urged to use every endeavor to make their returns and record as complete as possible. It is the duty of the physician to return the birth, but if he neglects this the registrar is entitled to the whole fee if he supplies the deficiency. It is too often, if indeed not always, the custom for physicians attending cases outside of the town in which they live to neglect to make any return of the birth, or if any be made, to return it in their own town. The attention of registrars is called to this evil, and if possible they should secure such returns. The certificates of birth could easily be sent by mail, and the fees returned at the end of the year. The value of these records for purposes of identification, and the annoyance and loss that ensue from their deficiencies, are illustrated again and again, so often that it seems needless to urge attention to these duties, but negligence and disregard of registration laws and details are far too common.

There were of these 14,051 births, 7,293 males and 6,693 females,—excess of male births, 400. Of 65 the sex was not returned, and also, it is to be presumed, the name omitted, else the sex might have been inferred. The excess of births over deaths was 4,657, a gain of 483 over 1878, due partly, no doubt, to more complete returns. The proportion of males to females is 109.72 male births to every 100 female, a little below the mean ratio for the last twenty years, which is about 110+ males for every 100 females. The general average in England and Continental Europe is a little over 105 males to every 100 females. There were 154 twin births and 160 illegitimate reported, an excess of 30 twin births and of 22 illegitimate over 1878.

These were distributed as follows. The general birth-rate for each county is as follows :

		Birth Rate per 1000.	Twin.	Illegitimate.
Hartford	County,	23.5	32	44
New Haven	"	25.8	40	45
New London	"	19.8	10	16
Fairfield	"	19.1	24	28
Windham	"	25.0	13	8
Litchfield	"	19.4	17	7
Middlesex	"	28.2	9	6
Tolland	"	21.4	9	6
Total,			154	150

The average birth-rate per 1,000 for the State is 21.8. As seen by the table, the highest birth-rate (25.8) is in New Haven county; the lowest (19.1) in Fairfield county. The highest birth-rate of any town in the State is in Thomaston—40.8; and the lowest in Monroe—6.8; this town, curiously enough, reports the same death-rate—6.8. The larger proportionate birth-rates in the manufacturing towns, where the foreign population is congregated, are very striking. Thus, Easton and Putnam, 35; New Haven, 31.2; Meriden, 28; New Britain, 29.3. These generally range higher than the average for the county in which they are situated. The birth-rates for the different towns vary somewhat with the accuracy of the returns. In quite a number of instances the birth-rate is less than the death-rate very markedly, as in Morris, where the birth-rate is 7.5, the death-rate, 27.5; Salem, 12 birth-rate to 36 death-rate; more often slightly in excess, as Colebrook, 12 to 14; West Hartford, 8.2 to 10.9; Wethersfield, 17.9 to 19.3; but in no other instance than Monroe is it evenly balanced. In general the birth-rates largely exceed the death-rates, as in New Haven, 31.2 to 16.3 death-rate; Brooklyn, 23.8 to 12.1, and so on. In some cases the discrepancy is cause by the imperfections in the returns, in some by the special efforts to secure complete returns of deaths.

The following table shows the nationalities of those born of foreign-born parents, by counties.

COUNTIES.	Irish.	English.	Canadians.	Germans.	Scotch.	Swedes.	French.	Portugese.	Danes.	Italians.	Swiss.	Mixed.	Total.
Hartford........	712	75	44	139	18	14	2	..	7	1	1	15	920
New Haven......	912	117	68	350	8	3	2	..	..	2	..	44	1,508
New London.....	270	30	166	30	12	2	..	16	..	..	1	11	522
Fairfield.........	413	45	3	110	6	5	2	..	..	5	1	40	627
Windham...... ..	125	15	358	5	2	2	..	1	..	1	..	5	514
Litchfield........	170	17	19	22	9	3	8	..	..	..	..	6	254
Middlesex.......	124	27	3	24	3	13	3	..	..	1	..	4	205
Tolland..........	50	10	21	42	6	2	..	1	2	..	..	12	139
Total	2,776	336	682	722	56	44	17	17	9	10	3	137	4,689

This includes all births of foreign parentage where the nationality of the parents were stated. By mixed is meant father of one nationality, mother of another. The increase in the number of Canadian births is indicative of a large immigration to the manufacturing towns of Windham and New London counties of Canadians. The number of the Germans is also evidently increasing. The Swedes are beginning to figure among the population. Excepting the settlement in New London, there are few if any Portuguese in this State. By mistake, the number representing the Irish births last year in Tolland county was printed 469 instead of 69, as it should have been. Among other foreign nations, Russia is represented by 1; Western Islands, 6; Norway, 2; Azores, 1; Nova Scotia, 2. On the whole the number of births from foreign-born parents is less than in 1878, but not very markedly.

The following table shows the age of the mother at the birth of the first child, selecting representative ages, 18–20, 20–30, and so on, representing both American and foreign-born mothers, as far as the returns were complete, which is the case in the great majority of towns. That is, these facts were stated in regard to the greater number of births.

NO. OF MOTHERS AT	American Mothers.					Foreign-Born Mothers.				
	15 to 18.	18 to 20.	20 to 30.	30 to 40.	40 to 50.	15 to 18.	18 to 20.	20 to 30.	30 to 40.	40 to 50.
Birth of 1st child.	56	502	1,498	241	11	4	99	517	153	4
" 2d " .	..	91	1,270	378	9	..	19	688	174	3
" 3d " .	..	16	785	590	13	..	3	439	269	3
" 4th " .	..	1	362	364	12	..	...	307	326	9
" 5th " .	..	...	156	284	14	..	...	194	347	10
" 6th " .	..	...	90	265	12	..	...	46	312	29
" 7th " .	..	...	11	61	15	..	...	14	107	14
" 8th " .	..	...	.....	48	10	..	...	.....	56	16
" 9th " .	..	...	.....	25	5	..	...	.....	65	17
" 10th " .	..	...	.....	7	4	..	...	.....	26	14
" 11th " .	..	...	.....	2	5	..	...	.....	12	8
" 12th " .	..	...	.....	3	2	..	...	.....	6	7
" 13th " .	..	...	.....	3	1	..	...	.....	1	4
" 14th " .	..	...	.....	2	...	..	...	.....	.....	...
" 15th " .	..	...	.....	.....	...	..	...	.....	1	4
Total....	56	610	4,152	2,373	111	4	121	2,205	1,855	132

This table is very interesting and instructive. The greater number of foreign-born mothers that bear more than the sixth child is very forcibly shown, the numbers in the first half of the table falling very rapidly. In studying the table, it must be borne in mind that the American mothers exceed the foreign-born by 1,453, which increases the ratio in favor of the larger families among the latter. There was one birth reported, father's age seventy, mother's sixty-nine; the nationality of the parties was not stated. Such instances are not frequent.

MARRIAGES AND DIVORCES.

There were 4,373 marriages and 316 divorces reported in 1879, a gain of 58 marriages over the preceding year, and 85 less divorces, which verifies the prediction that the repeal of the omnibus clause in the divorce laws would show an immediate effect upon the number of divorces. The number of marriages, however, still shows the pressure of hard times, and is much below the average, especially when the increased population is considered; the number last year was the least for fourteen years, and 1879 shows but slight gain, helped somewhat, however, by the decrease in divorces. The increasing difficulty of obtaining a livelihood, and the decrease of early marriages, as well as of the total number, indicates a massing of population, and a tendency towards the state of affairs found in the old world. Either marriages must decrease or the economies of life increase so that comfort can be secured on less income. This has a far greater influence than the increase of crime and licentiousness, often adduced as the cause of the decrease in the number of marriages, and especially of early marriages.

There was one marriage reported where the age of the bride was 14, age of groom not stated. The earlier age, comparatively, at which women marry is strikingly brought out in this table.

Thus, 642 more women are married before the age of twenty than men. After thirty the number of marriages declines very notably, as is seen when the second and third marriages are subtracted from the totals. The greater number of second and third marriages in men is noticeable, while widows in such cases do not appear to have the entire preference. In 187 of these it was the first marriage on the part of the woman. This leaves, however, 393 where it was the second marriage in both cases.

Of these marriages, in 2,958 both parties were of American birth. In 752 both were of foreign birth. Of the remainder, in 257 the husband was born in this country, in 389 the wife. The other parties foreign-born, 17, not stated. There were 162 marriages of non-residents, and 334 where the husband only resided out of the State. Three towns, Hartland, Rocky Hill, and New Fairfield, report no marriages; six reported one each: Marlborough, West Hartford, Beacon Falls, Bethany, Chaplin, Bolton. Five report 2 each; East Granby, Wolcott, Middlefield, Lisbon, Andover. Several reported three and four; all these were much below the average.

The following table shows the approximate age. As this is the first of the kind compiled in this State, it is impossible to make any comparative statements. The table also gives the number of first, second, and third marriages, etc.

Table Showing Ages at Marriage, and the Number of 1st, 2d, 3d, and 4th Marriages During the Year 1879.

BRIDES' NUMBER OF FROM	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	TOTAL.
At First Marriage,....	752	2,666	305	68	23	3	..	1	3,817
Second "	4	122	125	80	54	22	2	1	411
Third "	....	......	....	3	3	..	..	..	6
Totals, ...	756	2,788	436	151	80	25	2	2	4,234
GROOMS, NUMBER OF.									
At First Marriage,....	114	2,850	537	105	20	3	..	1	3,630
Second "	....	136	96	168	102	72	6	..	580
Third "	....	2	1	7	5	6	1	..	22
Fourth "	....	......	....	1	....	1	..	..	2
Totals, ...	114	2,988	634	281	127	82	7	1	4,234
Number not stated,...	....	......	....	....	....	..	..	..	139
									4,373

DIVORCES.

The following discussion of the divorce laws appeared in the *Evening Post*, of Hartford; as it presents the history so well it is transcribed here.

" Only a brief period of time elapsed after the settlement of the Colonies of Connecticut and New Haven before divorces began to be granted, and prior to the union of the two colonies upwards of twenty unhappy couples had been legally separated. The first divorce granted by Connecticut was for desertion, in May, 1655. In the revision of the statutes of 1672, the only reference made to the subject is under the title of courts, where the court of assistants is vested with the right of divorce. The first Connecticut law defin-

ing the subject was enacted in October, 1677, when they were authorized in case of adultery, fraudulent contract, desertion three years with total neglect of duty, and seven years' absence of one party without being heard from. In the latter year Mary Murraine was released from her conjugal tie with Patrick Murraine 'with libertie to disspose herself in marriage as God shall grant her oppertunety.' Down to 1843 divorces were granted by the courts for the above causes only, and a person desiring a divorce for any other reason had to apply to the General Assembly. But very few applications to the legislature are on record. In 1843 habitual intemperance and intolerable cruelty were also added as legitimate causes for divorce.

PASSAGE OF THE OMNIBUS CLAUSE.

In 1849 exclusive jurisdiction in regard to divorces was given to the Superior Court, and in addition to the causes of divorce then in existence were added the following: Sentence to the State prison for life; bestiality or the commission of any infamous crime involving a violation of the conjugal relations and punishable by imprisonment in the State prison; any such conduct as permanently destroys the happiness of the petitioner, and defeats the purpose of the marriage relation. The last clause mentioned is now known as the famous, or infamous, 'omnibus clause.'

"It will be seen by the above, therefore, that subsequent to 1849 there were nine causes on the statutes under which divorces could be obtained. Of these it will be noticed that the 'omnibus clause,' although appearing on first inspection a good and sufficient cause for divorce, still, when carefully considered, it will be seen that great latitude is given by it. Under this clause a divorce could be granted on almost any grounds, and so ingenious were some of the causes that it has been said that it was only sufficient for the petitioner to allege and prove 'cold feet' on the part of the respondent in order to obtain a divorce. The methods of serving the notice of the petitioner for the decree to the respondent were also faulty, and many instances of the abuses arising from this might be cited. Advantage of the law was taken not only by residents of Connecticut, but also of other states.

"By the omnibus clause the widest range was given to persons desiring a divorce, and the number of them increased with astonishing rapidity. In his extended treatise on the subject of divorce, published in *The New Englander* in the year 1867 and 1868, Ex-

President Woolsey, of Yale, thoroughly discusses the subject, and plainly shows the license granted for separation to disaffected couples under it. According to Dr. Dwight, as quoted by President Woolsey, the number of divorces in Connecticut subsequent to the passage of this clause in proportion to the population far exceeded the same proportion in France in '93. The marriage-chains being so easily broken, about the year 1870 a crusade against the omnibus clause was begun. In his message to the General Assembly in 1871 Governor Jewell spoke as follows:

"'Our divorce laws, unless changed, bid fair to bring us into disrepute. They are notoriously loose, more so than of any other State except Indiana and Illinois. In the year 1870 there were in this State 408 divorces and 4,871 marriages, a ratio of about one to twelve, which has been about the proportion for several years. In Vermont the ratio is one to twenty-one, in Ohio one to twenty-seven, in Massachusetts one to forty-four. Divorces may be granted in this State for too many causes, in fact for almost no cause at all. Discontented and vicious people come here from other States to get divorces which the more strict legislation of their own States deny, thus creating much scandal, and tarnishing the fair fame of our State. Some marked cases of this kind have occurred in the past year, which loudly call for reform in our laws.'

"The matter excited the general interest of the best citizens, and at the session of 1871 the legislature passed a resolution appointing a committee, consisting of one senator and eight representatives, to consider so much of the Governor's message as related to divorce. The committee, of which Hon. Elisha Johnson of Hartford was chairman, gave all parties interested an extended hearing. At the hearing almost every religious denomination was represented by able clergymen, and prominent members of the bar earnestly advocated a revision of the divorce laws. No one appeared in favor of the then-existing statute. In their report the committee recommended several changes in the statutes applying to divorce, among which the chief were that the respondents should not be allowed to marry again without the consent of the court; that the petitioners should not be allowed to marry for two years; also that the process, or legal machinery, in regard to the serving of the notice of the petition upon the respondent, should be radically changed. The committee introduced a bill to the above effect and it passed the Senate almost unanimously, but as there was no one to champion it in the House it was defeated.

REPEAL OF THE "OMNIBUS CLAUSE."

"The opponents of the omnibus clause did not lose heart at this failure, but kept steadily at work until the January session of the year 1878; Governor Hubbard being Governor, the omnibus clause was repealed, and the causes for which divorces may now be granted were reduced to the following, viz.: adultery, fraudulent contract, wilful desertion for three years with total neglect of duty, seven years' absence during which the absentee has not been heard from, habitual intemperance, intolerable cruelty, sentence to imprisonment for life, any infamous crime involving a violation of conjugal duty. The reformers also succeeded in changing the methods of serving the notice of the petitioner, and at the last session of the legislature, January, 1880, an act was passed providing that no decree of divorce shall be granted until ninety days after the complaint is made returnable. This was a great victory for the anti-omnibus men, but the statute is not yet as the extreme representatives of the party would wish it. As the law stands, it is competent for any couple to disregard the family ties and separate merely by consent and the performance of the formalities of the courts. In many instances it is a subject of contract between the parties as to which shall appear in the position of respondent, and it seems to be considered an act of gallantry that the man should thus appear. There is an instance in the State of a woman who has been married and divorced four times, and each of her husbands in turn married again and been divorced. Her first husband procured a divorce from her, and she was married again. Becoming divorced from her second mate she remarried the first, and has since been divorced from him and has married a fourth time. Her second husband has been married and divorced twice, and both his wives are now living, and her present husband was a divorced man when she married him. It is no uncommon thing to find women under 30 years who have been twice divorced, and there are many cases of women under 19 years of age. As the law now stands, people dislike to have their names appear on the records as having been guilty of any of the offenses enumerated, and to this also the decrease in the number of divorces granted is due.

ENCOURAGING DECREASE IN THE NUMBER OF DIVORCES.

"The subjoined table, compiled from the State records, shows the great falling off in the number of divorces in the year 1879, when the law first went into effect:

Divorces in Ratio to Marriages.

YEAR.	Divorces.	Marriages.	Ratio.
1874..................	492	4,694	1 to 9.5
1875..................	476	4,385	1 to 9.4
1876..................	396	4,320	1 to 10.9
1877..................	427	4,319	1 to 10.1
1878..................	401	4,315	1 to 10.7
1879..................	316	4,342	1 to 13.7

Total proportion of divorces to marriages for the five years preceding 1879, ... 1 to 10.0

Proportion of divorces to marriages for the year 1879, ... 1 to 13.7

Per cent. of decrease for the year 1879, . . 27.

"By the above it will be seen that the decrease in the number of divorces during the first year after the repeal of the loose omnibus bill has been very large. The table is compiled from the records of the State librarian down to the year 1878, and after that from those of the Secretary of the State Board of Health. The returns for the year 1880 are not as yet compiled, but will probably show a large decrease in the number of divorces. The proportion of divorces to marriages for the five years preceding 1878 is almost identical with that of the previous twenty years, and gives a comprehensive idea of how easily a divorce could be obtained in Connecticut."

The following tables show the number of divorces by counties, and the causes. The tables do not exactly correspond, as several causes are often assigned, but the form is retained for uniformity of comparison.

NUMBER OF DIVORCES 1879, AND PRECEDING YEARS.

COUNTY.	Husband's Petition.	Wife's Petition.	Total in 1879.	Total in 1878.	Total in 1877.	Total in 1876.	Total in 1875.	Total in 1874.	Total in 1873.	Total in 1872.
Hartford.. ...	16	35	51	74	72	91	73	86	70	75
New Haven....	22	62	84	111	97	103	52	131	107	119
New London...	12	23	35	52	44	54	51	63	67	61
Fairfield.......	16	47	63	74	92	58	73	76	71	84
Windham......	8	19	27	28	35	17	36	46	51	28
Litchfield.....	11	12	23	23	36	25	45	39	40	31
Middlesex......	3	11	14	18	23	21	25	18	25	25
Tolland........	6	13	19	21	28	27	21	33	26	41
Total.......	94	222	316	401	427	396	476	492	457	464

CAUSES.

	Hartford County.	New Haven County.	New London County.	Fairfield County.	Windham County.	Litchfield County.	Middlesex County.	Tolland County.
Adultery..............	13	23	11	8	8	7	3	3
Intemperance...........	10	14	6	30	6	2	4	4
Infamous Crime	..	2	..	..	..	..	..	..
Cruelty...............	3	18	8	12	2	4	3	2
Desertion..............	23	33	10	44	11	14	5	9
Fraudulent Contract.....	..	1	..	..	..	..	..	..
Misconduct....	1	1	..	..	..	..	1	1
Life Imprisonment......	1	..	..	..	..	..	..	..

CAUSES OF DEATH.

It is now pretty generally agreed that one of the chief elements in the wealth or capital of a State is its population. Indeed, the numerical value of each individual has been reduced to an average. Taking the population generally, each person represents a value of one thousand dollars; more exactly, each adult male sixteen hundred,* each adult female twelve hundred and fifty dollars. We have adapted the term productive period to that from twenty to sixty, as during that period each one produces more than the cost of his maintenance, averaging $130 a year during this period. Hence in estimating his value or loss the accrued wages must be added, as well as those he would have earned, in case of death before the average duration of life be reached. It is therefore evident, as the doctrines of Malthus have little following, that the prosperity of the State is increased by any measures that tend to increase the average duration of life, and the number that pass through this period in full health. Estimating the preventable deaths at one-fifth, the proportion usually conceded as wasted lives for the want of observance of sanitary laws, there were in 1879 560 needless deaths of persons within these limits—500 in round numbers. Taking $1,300 as an average value of these lives—not a high estimate—and we have $650,000 as the direct loss of capital, to which must be added the accrued wages sum.

Yet those measures that directly promote health and prolong life receive comparatively little attention commensurate with their claims. We go on polluting the soil around our dwellings and villages by sink-drains, vaults, and cess-pools, until it in turn contaminates the water that percolates through it to reach the well from which we slake our thirst, or the air that sweeps over it, already garbage-laden or poisoned by excrementitious filth, the dried particles from neglected refuse loading the air. The peaceful brooks are made vehicles of death, tons of waste and filth often actually thickening the water, which again pours forth the gases of decay to convey the germs of disease, till a wide-spread epidemic calls passing attention. Because these influences are *cumulative*, and time must often elapse ere the point of saturation is reached, too often thoughtlessness and neglect quickly succeed frightened attention. This is not, fortunately, invariably true. There are some lessons that have been thoroughly learned, and sanitary science now rests upon sure foundations, to say the least.

*London Economist.

CONSUMPTION AND LUNG DISEASES.

Consumption, as ever, outranks all other causes many times over, causing 1,307 deaths in 1879, about the usual average. This disease now ranks in the preventable class. Careful research has shown that only 25 per cent.* of cases are due to hereditary tendencies; the rest caused by unsanitary influences, the chief being breathing impure air, and especially rebreathing that devitalized by our own or another person's lungs. This is shown by the greater prevalence of consumption among men when they work indoors and women work outdoors, and the reverse, by the statistics of prison life and the picked armies and navies of the world. An important element in its causation, as before stated, is soil-moisture, and damp, ill-drained sites for homes have caused many needless deaths. The experience of all observing physicians corroborates this. Certain houses invariably induce consumption in any families that live long enough in them. The total from other diseases of the lungs is 890, making a grand total of 2,197, nearly a fourth of the total mortality. The number of deaths from pneumonia is unusually large—626; the average for the last few years being about 450. There were many reported as typhoid-pneumonia, and in others the description resembled closely the pyogenic form due to filth. As these cases were multiple, that is, several in one family or locality, their causation from unsanitary causes is more than probable. The same is true of many of those reported as typhoid-pneumonia. In other instances there were malarial complications so marked that the physicians in attendance called the variety malarial-pneumonia. One very singular fact is the prevalence of the disease throughout the year, though to a much greater extent in winter, when there were 289 deaths, 219 in spring, 252 in summer, 66 in autumn, March being the trying spring month. The deaths among males was in excess, while in consumption the deaths of females is 200 in excess, which fact bears out one theory of the causation of consumption, as women more often breathe the impure air of illy-ventilated apartments. The greatest mortality was in March—146; strangely enough April ranking next—136; the spring showing the greatest number of deaths from consumption—394, winter next—333, summer—295, autumn—285. Conclusions cannot be drawn from one year, but nearly the same ratio prevails in 1878, and markedly in spring. The greatest number by far die

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* Fox: Air, Water, and Food.

between 20 and 30, although deaths are reported at all ages, and the old-fashioned variety that does not shorten life now and then is reported, chiefly from the smaller towns.

ZYMOTIC DISEASES.

The decrease in mortality from these forms of disease is very marked. In 1877 they are credited with 26 per cent. of the total mortality, in '78 23 per cent., in '79 19 per cent. This is due, doubtless, to improved sanitary conditions in many instances, and a better observance of hygienic laws. Diphtheria prevails more extensively in the country than in the cities, unless some epidemic occurs to swell the mortality. The occurrence of isolated cases in remote, thinly-settled districts, with little if any travel, furnish strong presumptive evidence of its origin *de novo* from filth. Of the principal varieties typhoid fever is credited with 159 deaths only; the average for the last ten years, 370. Diphtheria, 256, while over 500 is the average for three preceding years. Croup, scarlet fever, and cholera-infantum are about the same as the average for the last ten years..

MALARIAL FEVERS

have increased steadily. In 1877, 45 deaths; 1878, 145; in 1879, 198. The congestive type is also well marked, and in some instances fatal in less than twenty-four hours. Unconsciousness and coma rapidly supervene. Enlarged spleens are met with more frequently, malarial broncho-pneumonia, enteritis, and cystitis, are reported, while various forms of anæmia, and especially of infantile debility are ascribed more or less accurately to malarial influences. One hundred and seventeen fatal cases of typho-malarial fever are reported. There is some doubt expressed with regard to the diagnosis of these cases—whether they are not really purely typhoid. This may be true in some cases, but there are without the least doubt a large number of mixed cases so closely related and uniform in symptoms as to deserve the name typho-malarial, and as can readily be seen, these cases are increasing. Cerebro-spinal meningitis, now endemic, is about as frequent as in 1878, occurring more especially in malarial districts.

HEART DISEASES

show the average mortality—440 deaths, rather more males than females. The large percentages from heart disease in some of the smaller towns is a remarkable feature,—usually where there are large areas of meadow land, slow streams, or ditches, and ponded water, as in Durham, 4 deaths in a total of 17, nearly 25 per cent.; New Hartford, 16 per cent.; Salem nearly 30 per cent.,—six out of 21. Those reported under five are generally congenital, but we do not find these in such towns as are referred to above. In a few cases rheumatic pericarditis was reported between 5 and 10 years. The greater number of acute cases from articular rheumatism occurring between 10 or 15 and 30. The largest mortality is found between 50 and 70; in 1879, 198 out of 440—nearly half.

INFANTILE DEBILITY

holds its usual rank, rather increasing if anything. The total number of infantile deaths also gives as usual about 30 per cent., the larger proportion in cities or towns, not enough difference, however, to indicate any great holocaust in the cities, nor as good a showing in favor of country life as might be imagined. Indeed, the few hot months of summer excepted, the average conditions favorable to infantile life are better in the city than in the country.

OLD AGE.

The comparatively large number dying of old age in 1879 is marked. Indeed, the mortality from 60 upwards is nearly a hundred greater than the infantile mortality, in 1878—over 300 less; and the deaths from 60 to 70—1,048—are greater than in any other decade, and is only exceeded by those under one, which is always largely in excess of all others. From 80 to 90 there were 661 deaths reported; 90 to 100, 145; and over 100, 13. The exact ages of those over one hundred is, perhaps, often somewhat problematical; there seems to be no doubt, however, in these cases that the persons were over one hundred at any rate, although the public records do not extend back further than 1848, so the ages could not be thus proven. The complaints of neglect of duty in officials because a birth occurring in 1812 was not registered were therefore hardly reasonable, even if a pension claim thereby fell through.

Nearly all the relations of vital statistics are comprehended

fully in the tables and summaries. The death rates have already been considered in their relation to birth rates. In studying them it must be borne in mind that in several cases they vary from a true ratio from changes that have been made in the boundary lines of the towns. The certified returns of population moreover had not been published in all cases when this report went to press, hence several errors may have arisen. In others the endeavor to secure a complete return raises the death rate of a town unduly above that assigned neighboring towns whose records are not so complete, as in East Hartford, where the records were completed by the faithful efforts of the registrar.

There are necessarily a few errors in so many combinations of figures; they are few, even the typographical errors that easily creep into a work of this kind, thanks to the careful superintendence of the chief of the proof-room. The tables have also been for the most part carefully overlooked by an expert, and it is hoped will be found satisfactory. They contain now all the information that the town registrars give, and several new features will be found which will be of increasing value as years pass. Indeed, this registration report preserves an epitome of the history of the people in many aspects. Much more is conveyed than the mere face of the figures and the sum total of the columns, and that too of a nature that cannot be found elsewhere. Each citizen figures here twice at least, when he enters life and leaves it, while the third great epoch in life finds here its record for the percentage that attain it.

LAWS

CONCERNING THE

Registration of Births, Marriages,

AND DEATHS.

REGISTRATION LAWS.*

It shall be the duty of the State Board of Health to have the general supervision of the State system of registration of births, marriages, and deaths. Said board shall prepare the necessary methods and forms for obtaining and preserving such records, and to insure the faithful registration of the same in the several counties, and in the central bureau of vital statistics at the capital of the State. The said Board of Health shall recommend such forms and amendments of law as shall be deemed to be necessary for the thorough organization and efficiency of the registration of vital statistics throughout the State. The secretary of said Board of Health shall be the superintendent of registration of vital statistics. As supervised by the said board, the clerical duties and safe keeping of the bureau of vital statistics thus created shall be provided for by the Comptroller of the State, who shall also provide and furnish such apartments and stationery as said board shall require in the discharge of its duties. That the said board, on or before the first day of December in each year, shall make a report in writing to the Governor, upon the vital statistics and the sanitary condition and prospects of the State.†

Section 1. Every registrar of births, marriages, and deaths shall hold office for one year from the first Monday in January next succeeding his appointment, and until his successor is appointed and qualified.

Sec. 2. The registrar shall ascertain, as accurately as he can, all the births, marriages, and deaths occurring in his town, and record the same in a book or books kept by him for that purpose, in such form and with such particulars as shall be prescribed by law. He shall give licenses to marry, according to the provisions of law, and shall make and perfect all records of the birth of any child born in his town. He shall record in the books furnished by the Bureau of vital statistics such facts con-

* The following provisions are compiled from the unrepealed portions of the different statutes.

† January Session, 1878.

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cerning the births, marriages, and deaths in his town as may be therein required; and he shall amend his records as he may discover omissions or mistakes therein; annually, on or before the twenty-fifth day of January, shall send the superintendent of vital statistics an attested abstract of said records for the year next preceding the first day of said January, which shall be made in such form as shall be prescribed by said superintendent, and shall deposit a true copy thereof with the town clerk.

Sec. 3. Every physician or midwife, who shall have professional charge of the mother at the birth of any child, and every attendant who may act as midwife at such a time, where no physician or midwife is employed, shall, during the first week of the month next succeeding such birth, furnish the registrar of the town wherein such birth may have taken place a certificate signed by such physician, midwife, or attendant, stating, from the best information which the signer of said certificate can obtain, the facts required by the Bureau of Vital Statistics.

AN ACT CONCERNING THE REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS.

Section 1. The registrar, for completing each record of birth by inserting the full name of the child, shall receive from the town ten cents, and for ascertaining, recording, and indexing each birth of which no certificate has been furnished, fifty cents.

Sec. 2. Every physician residing without the town wherein a birth or death occurred under his charge shall make return thereof to the registrar of such town, and he shall receive therefor from the registrar an order on the treasurer of such town for the fee prescribed by law.

Sec. 3. No deceased person shall be buried in any town having an incorporated city within its limits until a burial permit, stating the place of burial and that the certificate of death required by law has been returned and recorded, has been given by the registrar, who upon receipt of such certificate shall issue such permit; and upon application, when permits are required, the attending physician of the deceased, and the coroner in case of an inquest, shall give such certificate; or if there be no attending physician, or his certificate cannot be obtained early enough, or where immediate burial is required, any member of the local board of health, or any physician employed to have charge of the poor of said town or city, shall give such certificate to the best of his knowledge and belief, and the registrar shall record the place of any burial other than in a public cemetery, and for each permit shall receive twenty-five cents from the town.

Sec. 4. In all towns the secretary or committee of each cemetery association shall report to the registrar of the town in which such cemetery is situated the name of the sexton at present in charge of such cemetery, and of any change hereafter.

Sec. 5. Every person having charge of any burial-place shall during the first week of every month return a list, for which he shall receive fifty cents, of all the interments, disinterments, and removals made by him during the next preceding month, with the date thereof to the registrar of the town, who shall record the same in a book to be furnished by the bureau of vital statistics.

Sec. 6. Every person violating any of the provisions of this act shall be punished by a fine not exceeding twenty-five dollars.

Sec. 7. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, March 28, 1879.

AN ACT RELATING TO RETURNS OF DIVORCES.

Section 1. The returns of divorces required of clerks of the superior court to the State librarian, by section three, part sixteen, chapter one, title three of the general statutes, shall hereafter be made to the secretary of the State board of health, which returns shall be tabulated and published in the annual report of said board.

Sec. 2. This act shall take effect from its passage.

Approved, March 28, 1879.

TOWN OR CITY BY-LAWS.

Any town or city may enact by-laws, not contrary to law, more effectually to obtain a perfect registration of births, marriages, and deaths; and the registrar of the town in which such by-laws may be enacted shall execute their provisions under the same oath and penalty as if they were the statute laws of the State.

FEES.

Registrars of births, marriages, and deaths shall receive for ascertaining and recording each birth, marriage, or death ten cents; for issuing a certificate of license for marriage, fifty cents; for making an abstract, two dollars; for each name on such abstract over two hundred, two cents.

No person shall open any grave for the disinterment of the body of any deceased person, in any public or private cemetery or burial-place, or disinter or remove such dead body from the town in which the death took place, without having procured from the registrar a permit therefor.—Feb. 28, 1877.

DISINTERMENTS.

On the receipt by the registrar of a certificate of death, properly made in the form furnished by the superintendent of vital statistics, the registrar shall issue a permit for the disinterment or removal of the body of any deceased person, stating therein the

locality of the interment, disinterment, or removal. No permit for the disinterment of the body of any deceased person during the months of June, July, August, or September shall be issued, except when required for the purposes of a legal investigation.

Every registrar of births, marriages, and deaths shall receive for issuing each permit as herein provided the sum of twenty-five cents.—Feb. 28, 1877.

RETURNS OF BIRTHS AND DEATHS.*

Duties of Persons who Shall Make Returns of Births and Deaths to the Registrars.

BIRTHS.

Physicians or midwives, or any person acting as midwife at the birth of a child, should make return of the same, upon the blanks furnished by the Registrar, within the first week of the month next succeeding such birth, signed by the person making the returns, stating the facts therein required from the best information which the signer can obtain. Each birth should be promptly reported, and the record of the name inserted afterwards. Parents should be instructed to report the name to the physician or registrar as soon as determined. A provision is made for a fee for the registrar on completion of an imperfect record.

DEATHS.

It is the duty of the attending physician to report on the blanks furnished by the registrar each death, with all the facts required by law. In cities, this certificate of death should be in the hands of the registrar before a burial permit is issued. There is no other way to secure complete returns of deaths in populous places than by the system of burial permits. The testimony is unanimous on this point. By reference to the bulletins of the National Health Board it will be seen that the cities which do not require a burial permit previous to interment are rapidly becoming exceptional. The attention of physicians is respectfully urged to the requirement for promptly filling out certificates of death. A little care on their part will save a great deal of unnecessary friction. If the cause of death be written in by the physician, and the certificate signed by him, the other facts can be readily filled out by the undertaker.

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*The following suggestions concerning the provisions of the registration laws are given in reply to questions that have been submitted.

It is the duty of the physician to sign the certificate of death *forthwith.* The friends of the deceased should secure from the attending physician as soon as may be after death the certificate required by law, and furnish it to the registrar, who shall then issue the permit for burial. Proper respect for the dead demands at least that much attention be paid to their memory. The friends of the deceased are the proper persons to arrange this matter, to see that the facts concerning the last event in life about which the State concerns itself with relation to each citizen be correctly stated. The business and social elements involved also justify the utmost precision and care. Protection of life and prevention of crime are also involved in this transaction.

Where burial permits are not required, the physician should return the certificates of death each month to fulfill the requirements of the law. Negligence here is by far too common.

COMPENSATION.

The fee for returning the certificates of birth and death is twenty-five cents. The penalty for violation or non-compliance with the registration laws relating to returns of births and deaths, is not less than ten dollars, nor more than twenty-five dollars.

DUTIES OF PERSONS BEFORE WHOM MARRIAGES MAY BE SOLEMNIZED.

Authority and its Limitations.

All judges, justices of the peace, and ordained or licensed clergymen belonging to this State or any other State, so long as they continue in the work of the ministry, may join persons in marriage, and all marriages attempted to be celebrated by any other person shall be void; but all marriages which shall be solemnized according to the forms and usages of any religious denomination in this State shall be valid.

Marriage within a certain degree of consanguinity is by law declared void.

CERTIFICATE OF LICENSE FOR MARRIAGE REQUIRED PREVIOUSLY TO THE CEREMONY.

No clergyman or magistrate is authorized to solemnize a marriage until a certificate of license is first delivered to him, under penalty of a fine of not more than five hundred dollars, or impris

onment, one or both. The marriage license can be used only in the town where it was issued; if used in any other town, the officiating clergyman or magistrate is liable to a fine of not less than one hundred dollars, or imprisonment, one or both.

RECORD AND RETURN REQUIRED.

Every clergyman or magistrate is required by law to return to the registrar, within the first week of the month next ensuing, the license certificates, with the fact, time, and place of each marriage certified thereon for all marriages celebrated by him during the month preceding, under a penalty of ten dollars for each omission.

The certificates should be signed with name and official title.

LAWS CONCERNING MARRIAGE.

(General Statutes, Title XIV.)

Chap. I.

Sec. 1. What Kindred cannot Marry.
Sec. 2. Marriage License.
Sec. 3. Certificate of Marriage.
Sec. 4. Certificates *prima facie* evidence.
Sec. 5. Who may join persons in marrage.

Section 1. Marriage between certain relatives prohibited.

Sec. 2. No person shall be married until one of them shall inform the registrar of the town in which the marriage is to be celebrated, or in case of his inability the town clerk, of the name, age, color, occupation, birth-place, residence, and condition (whether single, widowed, or divorced) of each. Such registrar or town clerk shall thereupon issue his certificate that the parties therein named have complied with the provisions of this section, which certificate shall be a license to any person authorized to celebrate marriage to join in marriage within said town only the parties therein named; but no such certificate shall be issued if either of the parties is a minor under the control of parent or guardian, until such parent or guardian shall give to the registrar or town clerk his written consent; and any registrar or town clerk who shall knowingly issue such certificate without such consent shall forfeit to the State one hundred dollars. Any person who shall join any persons in marriage without having received such certificate shall forfeit one hundred dollars.

Sec. 3. Every person who shall join any person in marriage shall certify upon the license certificate the fact, time, and place of such marriage, and return it to the registrar of the town where it was issued, upon or during the first week of the month next succeeding such marriage, and upon failure thereof shall forfeit ten dollars. The penalties for joining persons in marriage in violation of this and the preceding

section shall be paid to the town where the offense is committed, and the registrar shall sue therefor.

Sec. 4. The certificates required by the preceding sections of this chapter shall be *prima facie* evidence of the facts therein stated.

Sec. 5. All judges, justices of the peace, and ordained or licensed clergymen belonging to this State or any other State, as long as they continue in the work of the ministry, may join persons in marriage; and all marriages attempted to be celebrated by any other person shall be void; but all marriages and rites which shall be solemnized according to the forms and usages of any religious denomination in the State shall be valid.

Title 20. Chap. II.

Sec. 17. Every person who shall knowingly publish a false and fictitious notice of any birth, marriage, or death shall be fined not more than one hundred dollars, or imprisoned not more than six months.

Chap. VII.

Sec. 2. Penalty for bigamy: imprisonment in State Prison not more than five years.

Sec. 3. Every man and woman who shall marry within any of the degrees of kindred specified in the first section Chapter I, Title XIV, shall be imprisoned in the State Prison not less than two nor more than five years.

Sec. 21. Whoever undertakes to join persons in marriage, knowing that he is not authorized so to do, shall be fined not more than five hundred dollars, or imprisoned not more than one year, or both.

DUTIES OF REGISTRARS.

The registrar is the executive officer in each town for the registration laws, and it is his duty to see that they are complied with. It is his duty to make his record as complete as he can. Special provision is made by the act of 1879 for the completion of returns of births by securing the name of the child. The records of births are of little worth without the name.

In cities he is to issue burial-permits when required by law, and also permits for removal from one town to another. In case of disinterment or removal from one cemetery to another in the same town a permit is not required.

He shall record the facts required by law concerning births, marriages, and deaths in the record books furnished by the State, and should refuse to receive a certificate, glaringly defective, as a

satisfactory performance of the returns required by law. Where the required facts are manifestly unobtainable, of course a virtue must be made of necessity, and the incomplete returns accepted.

It is the duty of the registrar to issue marriage licenses on receiving a declaration of intention of marriage from one of the parties, and to record all marriages returned to him as solemnized in his town. In case of his inability the town clerk shall perform these duties.—*General Statutes, Title 3, Part V, Sec. 2.* The registrar is forbidden by law, under penalty of one hundred dollars, to issue a marriage license when either of the parties is a minor, under the control of a parent or guardian, unless such parent or guardian shall give to the registrar his written consent.

DUTIES OF SEXTONS.

Every person having in charge a burial place shall return to the registrar a monthly list of all interments, disinterments, and removals, in case there be any during the month. For such list he is entitled to a fee of fifty cents from the town.

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